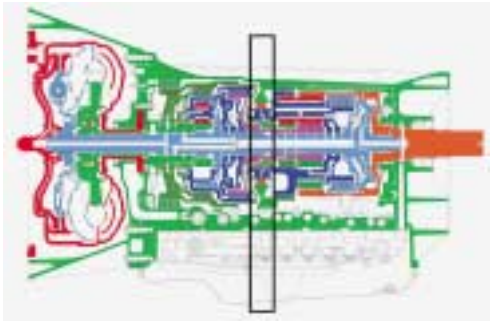
The free-wheel

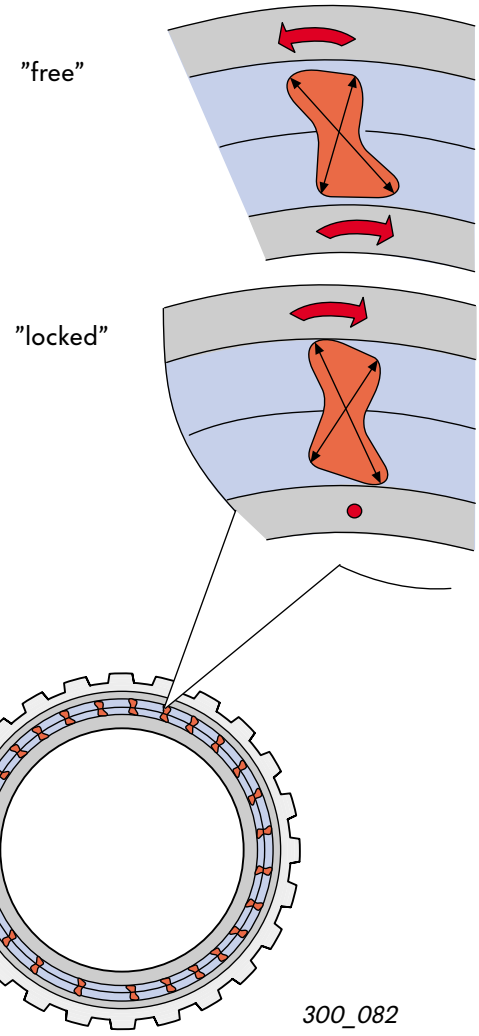
connects the planetary carriers of the dual planetary gear set with the gearbox housing.

If the exterior ring turns clockwise when the interior ring is braked, the bodies stand up and form a torsion-free connection between the interior and exterior rings.
Free-wheeling is "locked".
If the turning direction switches to anticlockwise, this connection breaks down.

Free-wheeling works in "D"- 1st gear and "S" – 1st gear, "tension" in the locking direction.
In Tiptronic mode, 1st gear "thrust" secures free-wheeling of the multiple disc brake B2.
This permits "engine braking".



300_022h



300_082

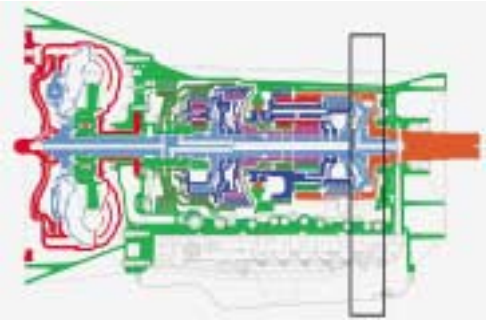
300_068

Design of gearbox

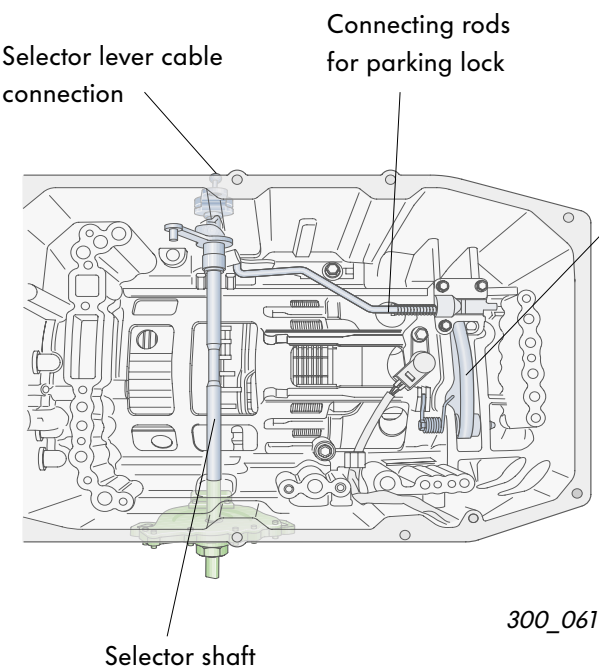
The parking lock

mechanically secures the vehicle from rolling away.
The parking lock is activated purely mechanically using the selector lever cable when the vehicle is at a standstill.
It engages in the parking lock wheel on the driveshaft and prevents turning of the driveshaft and thus of the vehicle wheels.

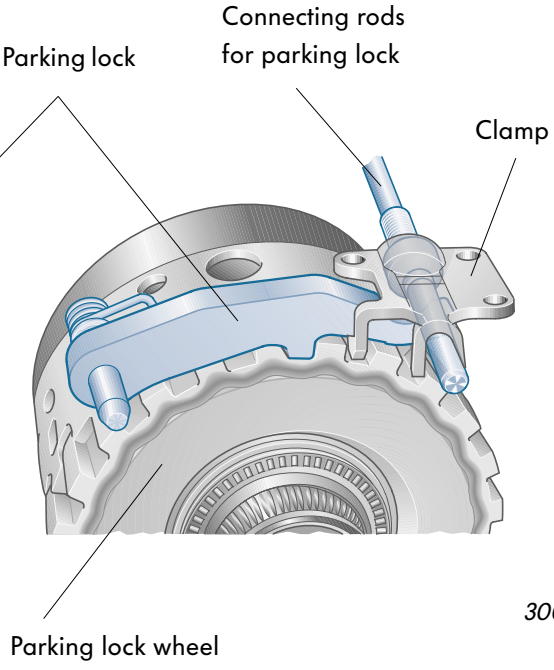
The clamp pushes the parking lock in the gear teeth of the parking lock wheel and secures it.



300_022g



300_061



300_018

Hillholder function

The hill-holder function secures the vehicle from rolling back and permits hills to be approached comfortably.

How it works

If the control unit for the automatic gearbox detects an incline due to the driving impedance while simultaneously detecting a driving speed of ”zero”, it switches into 2nd gear.
In 2nd gear, the vehicle cannot roll back because the internal gear of the dual planetary gear set would have to turn in reverse against the locking free-wheel.

Free-wheeling is released and the vehicle starts comfortably only after the starting torque is greater than the slope descending force.

Assignment table

The following table shows in which gear the individual multi-disc couplings and multiple disc brakes are closed.

	Component					
Gear	K1	K2	K3	B1	B2	F
1st gear	X				*	X
2nd gear	X			X		
3rd gear	X		X			
4th gear	X	X				
5th gear		X	X			
6th gear		X		X		
R gear			X		X	

* ”Engine braking”

The braking force of the ”pushed” engine in particular driving situations – such as steep downhills – can be taken advantage of by applying the 1st gear in Tiptronic mode.

The multiple disc brake B2 is closed in 1st gear only in Tiptronic mode.

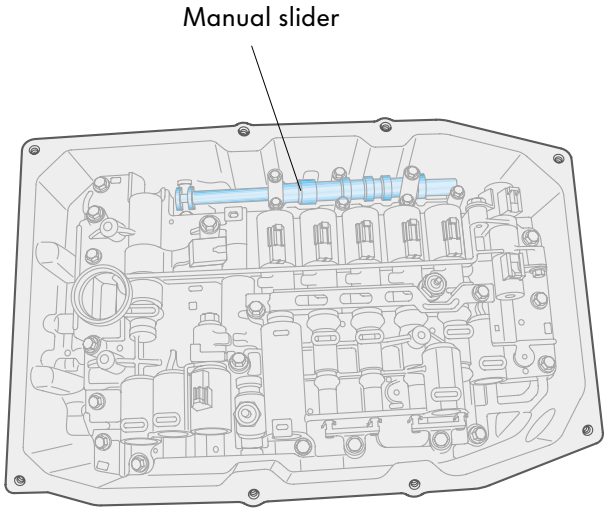
Design of gearbox

Emergency run

After certain components fail, normal operation of the automatic gearbox is no longer possible. In this case, the automatic gearbox can be operated only in emergency run.
In emergency run, the converter bypass coupling is no longer closed and the gearbox is in 3rd gear in all forwards driving stages.
When the selector lever is switched to the "R" position, the manual slider is shifted, thus applying the Reverse gear.

The emergency run mode is indicated by a different display in the dash panel insert.

The "Effects of signal drop-out" section in the Sensors and Actuators chapter describes which components must fail to lead to emergency run.



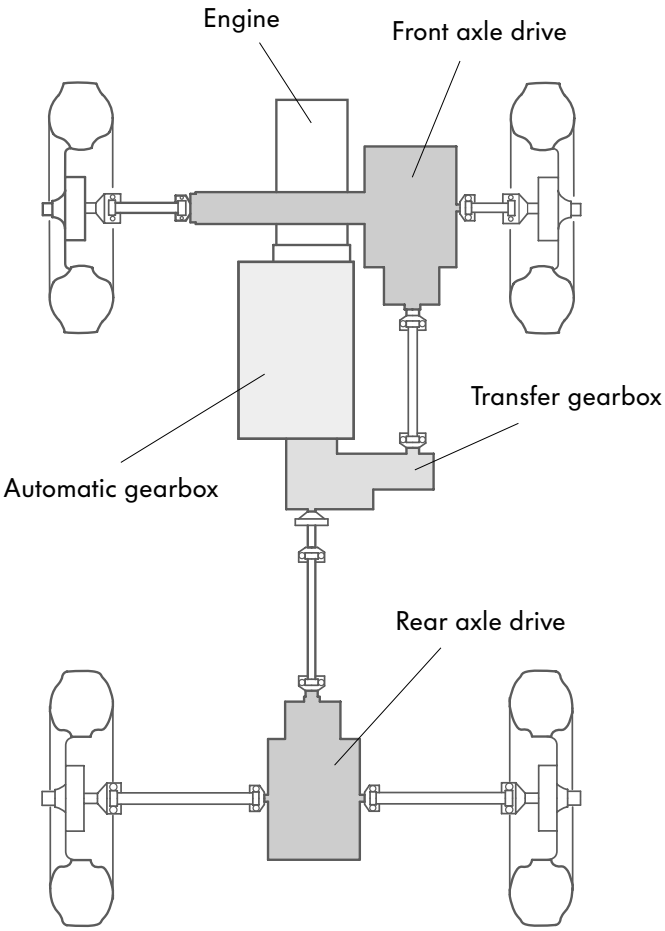
300_075

Torque transmission in the Touareg

The torque of the engine is transferred to the automatic gearbox using the torque converter.
As there is no axle drive within the automatic gearbox, a transfer gearbox is flanged onto the automatic gearbox.
The engine torque is transferred from the driveshaft of the gearbox to the transfer gearbox.
In the transfer gearbox, the torque is distributed between the front and rear axles, depending on the load.
The transfer gearbox can be locked. This fixes the torque distribution between the front and rear axles.
Each axle receives 50 % of the torque.

In addition, there is a switchable reduction in the transfer gearbox.
If this is switched on, the drive speed of the wheels is reduced by a factor of 2.7, thus increasing the drive torque.

In the transfer gearbox, the torque is transferred further between the front and rear axles using cardan shafts.
The differential of the rear axle to the transfer gearbox can also be locked using an electromechanical multi-disc coupling.

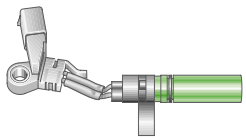


300_008

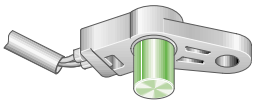
System overview

Sensors

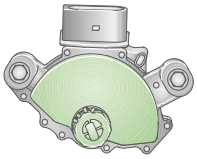
Gearbox input speed sender G182



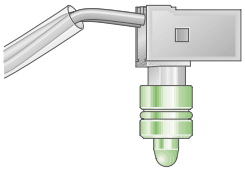
Gearbox output speed sender G195



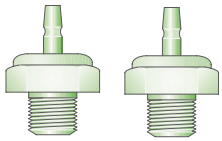
Multifunctional switch F125



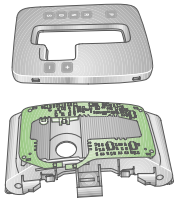
Gearbox oil temperature sender G93



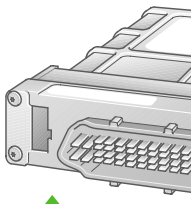
Sender 1 G193 and sender 2 G194
for hydraulic pressure

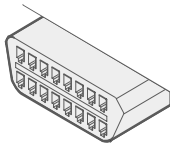


Switch for Tiptronic F189

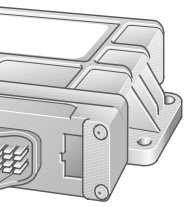


Switch for Tiptronic in steering wheel E438 and E439



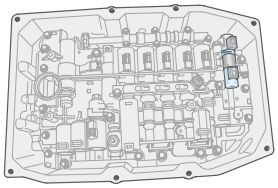


Diagnostic
connector

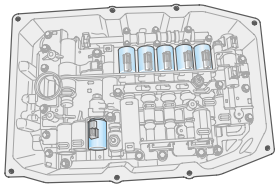


CAN data bus

Actuators



Solenoid valves in control valve assembly N88, N89

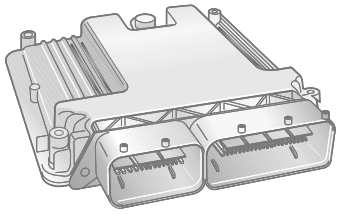


Solenoid valves in control valve assembly N90, N91, N92, N93, N282, N283

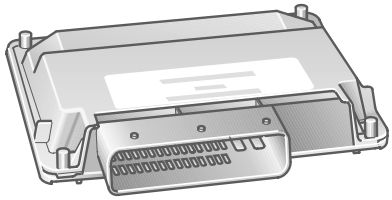
Magnet for selector lever lock N110

Control units

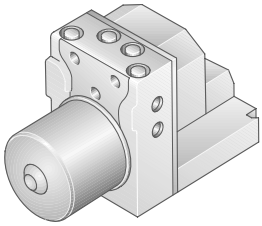
Engine control unit



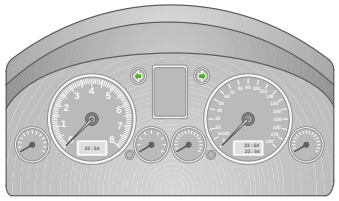
Control unit for transfer gearbox



ABS control unit



Control unit with display unit in dash panel insert



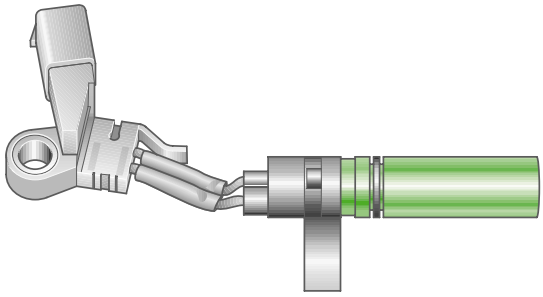
300_031

Sensors

The gearbox input speed sender G182

is located within the gearbox.
It is inserted in the housing of the ATF pump and uses a ring gear on the turbine shaft to determine the gearbox input speed.

It works according to the Hall principle.
Within the sender, there is an IC switch which activates the Hall sender.



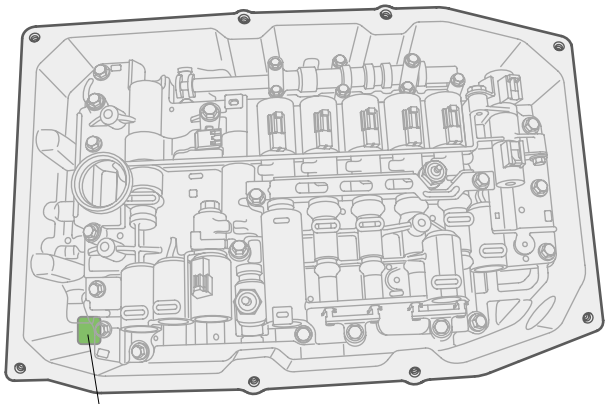
300_009

Signal utilisation

The control unit for the automatic gearbox uses the signal to detect the difference between the engine speed and the gearbox input speed. Using this speed difference, the slip of the converter bypass coupling is controlled up to a speed of 2000 rpm using the solenoid valve N91.

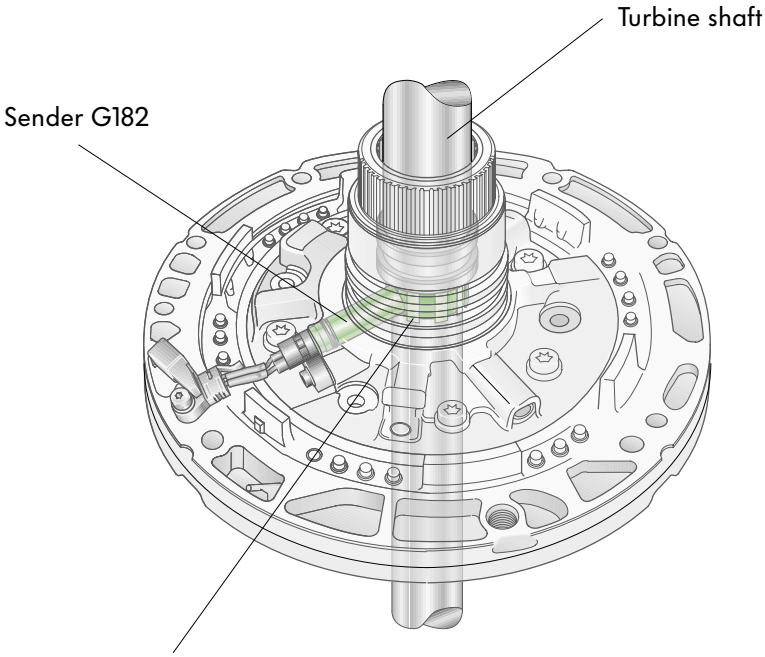
Effects of signal drop-out

The converter bypass coupling is closed without slip.
The engine speed is used as the replacement speed.



300_013k

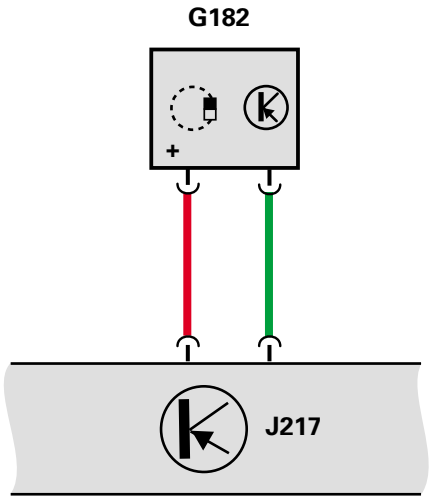
Sender G182



300_011

Electric circuitry

G182 - gearbox input speed sender
J217 - control unit for automatic gearbox

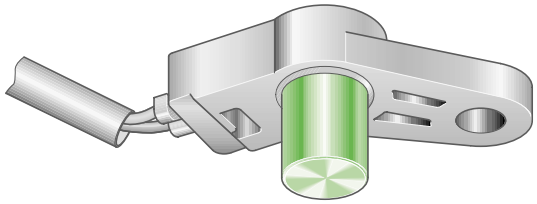


300_044

Sensors

The gearbox output speed sender G195

is located above the control valve assembly and is screwed onto the gearbox housing.
It determines the working speed of the automatic gearbox.
It scans the outer teeth of the internal gear on the rear planetary gear set.



300_010

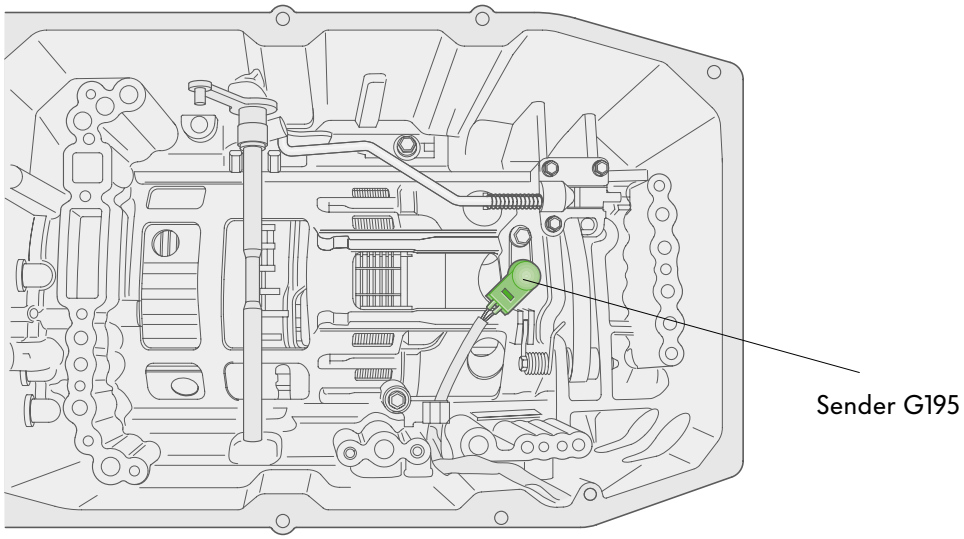
It works according to the Hall principle.
Within the sender, there is an IC switch which activates the Hall sender.

Signal utilisation

The control unit uses the gearbox output speed to start switching the gears according to the switching plan.

Effects of signal drop-out

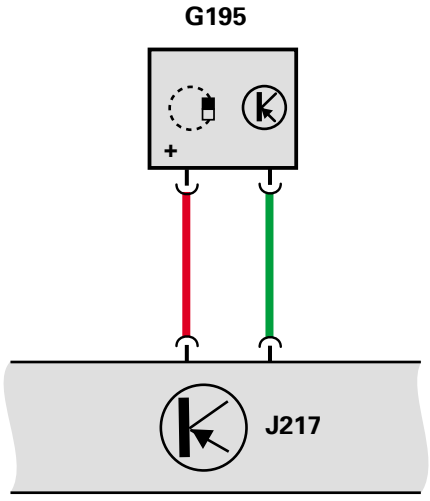
The speed signal of the ABS control unit is used as the replacement speed.



300_012

Electric circuitry

G195 - gearbox output speed sender
J217 - control unit for automatic gearbox



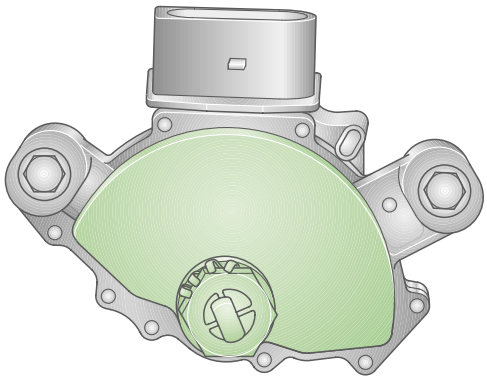
300_045

Sensors

The multifunction switch F125

is screwed onto the exterior of the gearbox.
Its duty is to further transfer the selector lever settings in automatic operation to the control unit for the automatic gearbox.
The multifunction switch is connected with the selector shaft and the selector lever cable.

If the multifunction switch is replaced, a position to the selector shaft must be set.
If the switch is incorrectly set, the engine cannot be started.



300_020

Signal utilisation

The control unit for the automatic gearbox starts the switch programmes according to the setting of the multifunction switch.

Effects of signal drop-out

As long as the difference between forwards and reverse gears can be determined, there are no effects on the switch programmes.

If the Reverse gear signal is defective, the gearbox enters the emergency run.