

Volkswagen Motorsport



Volkswagen

Volkswagen Golf **GTI** TCR DSG User Manual



Volkswagen Golf **GTI** TCR DSG
User Manual
2019





Volkswagen Golf GTI TCR DSG User Manual

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1. TECHNICAL INFORMATION

1.1 VW Golf GTI TCR Display

Type	4-cylinder in line 2.0 TFSI
Layout	Transversally mounted in front axle
Cylinder capacity	1984 cm ³
Bore and stroke	82,5 mm x 92,8 mm
Maximum power*	350 HP / 6250 rpm
Maximum torque*	410 Nm / 2500 to 5500 rpm
ECU	Continental SIMOS
Exhaust	Twin-end racing catalyst
Power transmission	
Transmission	Front-wheel drive
Gearbox	Direct-shift gearbox (DSG)
Differential	VAQ electro-hydraulic
Clutch	Standard double clutch
Shift control	Paddle-shift on steering wheel
Chassis	
Front suspension	McPherson, adjustable in height, toe and camber
Rear suspension	Multi-link adjustable in height, toe and camber
Anti-roll bar	Front and rear adjustable in 6 positions
Front brakes	6-piston calipers, 378 x 34 mm ventilated discs
Rear brakes	272 x 10 mm solid discs
Brake pedal	With brake balance regulation
Hand brake	Hydraulic with mechanical locking
Steering system	Full electrical power steering rack
Rims	Motec 10"x18"
ABS	Optional
Body	
Roll-cage	Welded steel FIA homologated
Weight	1205 kg
Front width (max)	1950 mm
Rear width (max)	1950 mm
Length	4597 mm
Wheel base	2665 mm
Equipment and safety	
Acquisition system	AIM - MXG 60 channels
Diagnostics	Auto-diagnosis OBDII / DiagRA - LE
Speed limiter (Virtual Safety Car)	5 variable speeds
Launch control	available
Airjack system	3 airjacks
Fire extinguisher	OMP
Seat	OMP
Fuel tank	FIA FT3 Fuel Tank

*depending on BoP

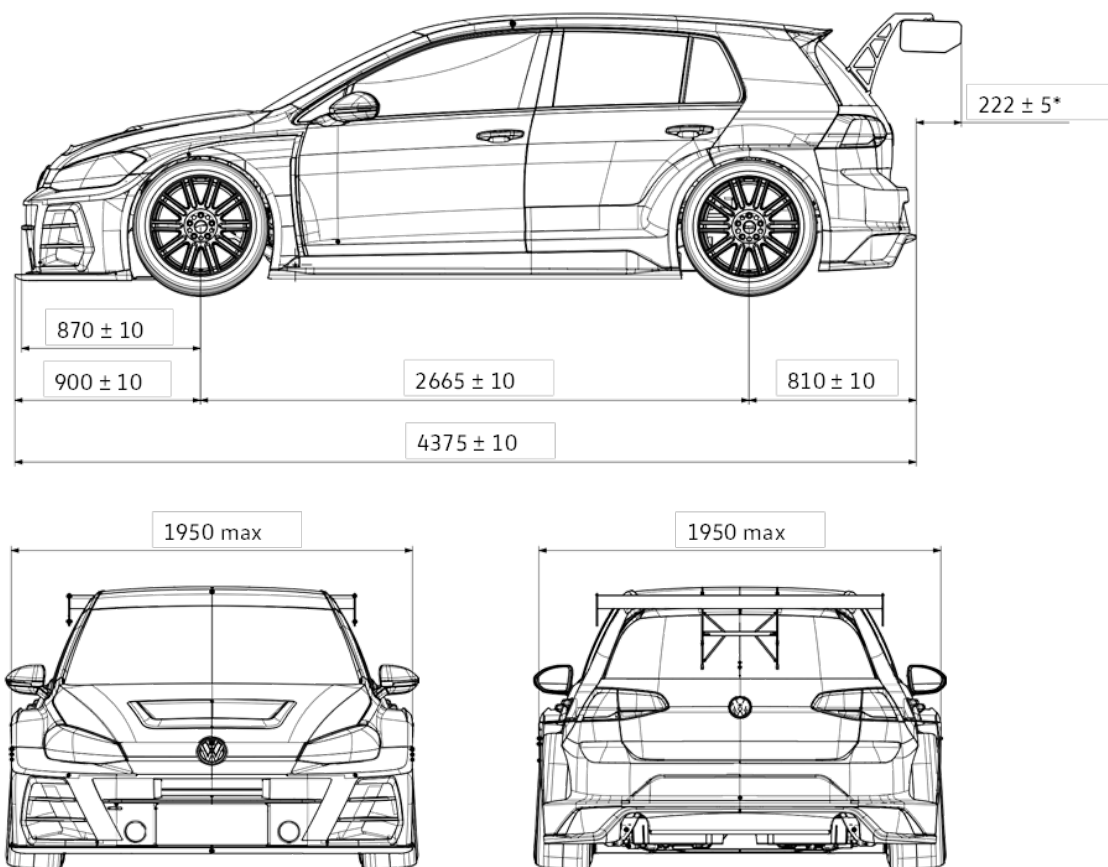




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1.2 Dimensions and weight

Dimensions	Measurements	Remarks
Overall length	4597 mm	Rear wing included
Overall bodywork front width	1950 mm	
Overall bodywork rear width	1950 mm	
Wheel base	2665 mm	
Over hang front splitter	900 mm	
Over hang front bumper	870 mm	
Over hang rear	810 mm	
Over hang rear wing	222 mm	From the wing to the bumper
Minimum ground clearance	-	80 mm according to TCR regulations



Weight	Measurements
Total weight in race conditions without fuel	1205 kg **
Car balance	60,2% front <-> 39,8% rear
Distribution weight/power	3,44 kg/HP

Notes:

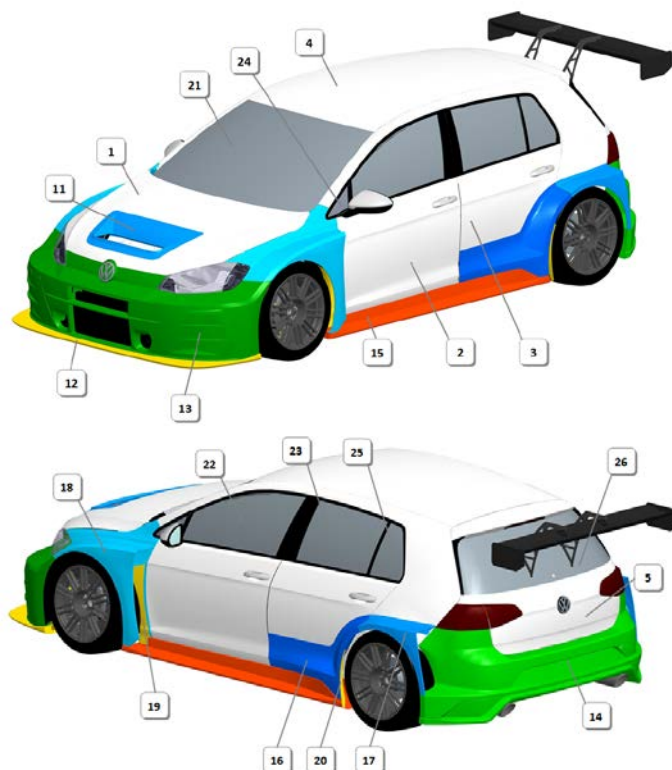
- * Measured from the rear bumper to the end of rear wing profile.
- ** The scrutineering dimensions and minimum weight are the ones on the Technical Form.



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1.3 Body-shell

Part number	Description	Material
01	Bonnet	Steel
02	Left / right front door	Steel
03	Left / right rear door	Steel
04	Roof	Steel
05	Boot lid	Steel
11	Bonnet opening	Carbon
12	Front splitter	Carbon
13	Front bumper	Fiberglass
14	Rear bumper	Fiberglass
15	Left / right side trim	Carbon, Kevlar & Fiberglass
16	Left / right rear door extension	Carbon (painted)
17	Left / right rear fender extension	Carbon (painted)
18	Left / right front fender	Carbon (painted)
21	Windscreen	Glass / optional plastic
22	Left / right front door window	Glass
23	Left / right rear door window	Glass
25	Left / right triangle rear door window	Glass
26	Rear window	Plastic

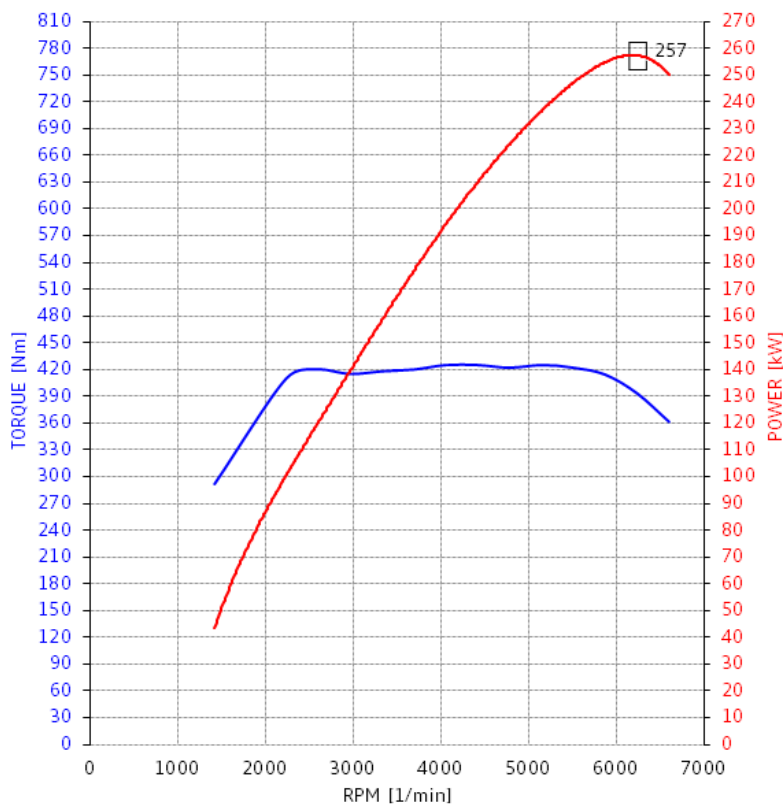




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1.4 Powertrain

Engine features	Description
Type	2,0 TSI / Turbocharged & direct injection
Engine identification	CJX
Cylinder capacity	1984 cm ³
Corrected cylinder capacity	1984x1,7 = 3372,8 cm ³
Maximum power	257 kW (350 HP) at 6250 rpm
Maximum torque	410 Nm at 2500 to 5500 rpm
Maximum rpm	6800 rpm
Specific power	175 HP/l
Electronic control unit	CONTINENTAL SIMOS 18.1
Fuel	RON MIN 98 / RON MAX 102
Fuel consumption	0,37 to 0,42 l/km
Exhaust / dB	Twin-end racing catalyzed FIA Homologated / 114 dB
Camshaft drive	Chain (sealed)
Oil system	Wet sump
Water pump	Mechanical water pump + one auxiliary electrical pump
Water thermostat	Electromechanical
Fan range	Operating range 92°C to 87°C





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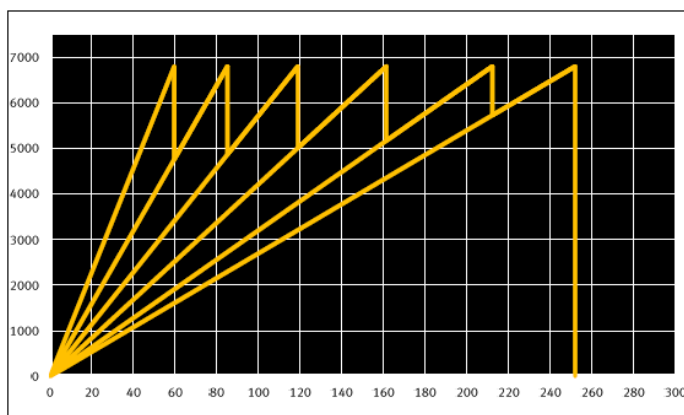
1.5 Fuel tank

Fuel tank features	Description
Fuel tank type	FIA FT3 homologated fuel tank
Capacity	100 l ±2%
Minimum fuel level before engine fault	Less than 1 liter
Ventilation valve	FIA homologated roll-over, ventilation and 200 mbar pressure regulator valve
Refueling	Safety FIA plug

1.6 Power transmission

Gearbox features	Description
Transmission	Front-wheel drive
Clutch	Standard double clutch
Gearbox	Direct-shift gearbox (DSG)
Gearbox mode control	Electronic lever on main console
Gearbox shift control	Paddle-shift on steering wheel
Gearbox control unit	Mechatronic in oil bath
Gearbox cooling system	Oil-water exchanger
Downshift over-rev protection	Electronically activated with memory function
Differential	VAQ electro-hydraulic with 3 modes available
Differential mode control	Dedicated button on steering wheel

Gear ratios								
GEAR	Z1	Z2	Gear relation	Total relation	RPM 3000	GEAR SHIFT 6500	CUT 6800	DIF RPM
1	13	38	0,342	0,071	26	57	59	
2	22	45	0,489	0,102	37	81	85	1952
3	28	41	0,683	0,142	51	113	119	1847
4	38	41	0,927	0,193	70	154	161	1711
5	32	35	0,914	0,254	92	202	212	1558
6	38	35	1,086	0,302	109		251	1026
Group 1-2-3-4	15	72	0,208					
Group 5-6	20	72	0,278					





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1.7 Chassis

Suspension features	Description	Remarks
Front damper Bilstein	2 way adjustable / Aluminum body	Clicks: 10 bump / 10 rebound
Eibach springs front and rear	170-200/60/70-80-90-100-110-120	Eibach ERS-H
Front antiroll-bar	22x2 // 22x3 // 22x4	Adjustable in 6 positions
Rear bumper Bilstein	2 way adjustable / Aluminum body	Clicks: 10 bump / 10 rebound
Rear antiroll-bar	22x2 // 22x3 // 22x4	Adjustable in 6 positions
Front and rear tenders	60/60/2	

Brake features	Description	Remarks
Front calliper	AP Racing Monobloc 6 pistons	Special: VW Group
Front disc	378x34	Special: VW Group
Front pump	AP Racing 19,1 mm	
Front pads	Pagid RST3	Thick: 25 mm
Rear calliper	AP Racing 2 pistons	
Rear disc	272x10	Solid
Rear pump	AP Racing 22,2 mm	
Rear pads	Pagid RS 44	
Rear press reducer	AP Racing 7 position lever	
Brake balance	Tilton balance bar	

Hand brake features	Description	Remarks
Hand brake	Hydraulic with mechanical locking	Acting on rear axle
Brake pump	AP Racing 15mm	

1.8 Wheels

Wheel features	Description
Rim dimension	10"x18" ET 36
Rim centre lock	5 studs x 112 mm
Maximum tyre dimension recommended	270/660 R18
Tyre temp difference inside/outside	20°C
Minimum cold pressure recommended	1.3 bar, according the specification of the tire manufacturer





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1.9 Electronic units

Electronic modules	Remarks	Software	Place
ECU	VW AG	Motorsport	Engine bay
Mechatronic	VW AG	Motorsport	Inside DSG
VAQ	VW AG	Motorsport	Connected to DSG
Low fuel pump control	VW AG	Series	Roll-cage
Fuel level display	VWMOSP	Motorsport	Cockpit
Electronic steering rack	VW AG	Motorsport	Front subframe
ABS/ESP unit	VW AG	Not active	Cockpit
Gateway	VW AG	Series adapted	Cockpit
Black box	VW AG	Motorsport	Cockpit
MXG display/logger	AIM	Motorsport	Cockpit
Fuse box	VWMOSP	Motorsport	Cockpit
Steering wheel module	VWMOSP	Motorsport	Cockpit

Modules based in series					
	Engine ECU	Low fuel pump	Steering rack	ABS/ESP	Gateway
Specific software/mapping:	Yes	No	Yes	Yes	Yes
Specific codifications:	Yes	No	Yes	Yes	Yes
Interchangeable between cars:	Yes	Yes	Yes	Yes	Yes
Spare part ready for plug and play:	Yes	Yes	Yes	Yes	Yes
Modification allowed:	No	No	No	No	No

Notes:

- Use always spare parts from VWMS. Although the mentioned parts derive from series cars, the software and codifications are different and modified by VWMS.
- All series modules used on the car are based in the MQB platform. Through the diagnostic tools available on the VW Group dealers, it is possible to diagnostic any malfunction.

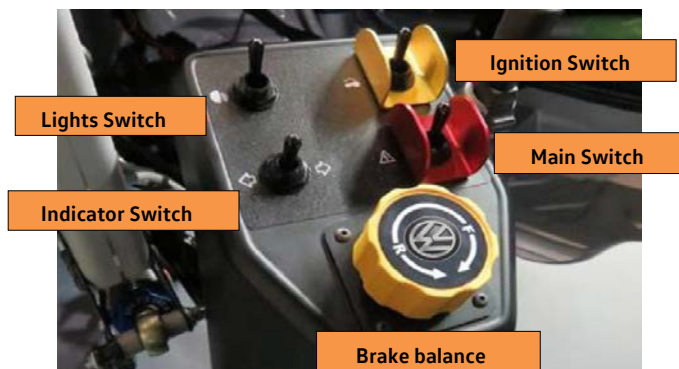


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2. DRIVER CONTROL

In this section, it is explained how the driver can handle the different commands and functions of the car within his range while driving

2.1 Main panel



Function	Remarks
Ignition switch:	It activates the power to all devices. The Main Switch has to be active.
Main switch:	It activates the power supply.
Lights switch:	It activates the low beam. High beam and flash activation buttons are placed on the steering wheel module.
Turn indicator:	It activates the left and right turn lights. A green alarm on the display appears showing that the turn light is blinking.
Brake balance:	Turning the balance wheel you can balance the brake pressure from front to back or vice versa. Do not press the brake pedal while moving the balance wheel. Through the driver display you can check the front and rear brake pressure and the balance in percentage.

Notes:

- To start the car, always proceed in this order: Main switch, wait until display has booted (VW logo disappears), then ignition switch.
- The correct procedure to stop the car is the following:
 1. Stop the engine using only the yellow switch (ignitionswitch/KL-15).
 2. Wait at least 60 seconds. If the waiting time is lower, the OBD faults memory is not saved.
 3. Switch off the car using the red switch (mainswitch/KL-30).
- If this procedure is followed correctly the OBD faults memory is saved and these faults can be checked with the diagnostics tools at any time thereafter. These faults are saved until the memory is deleted manually using the diagnostics program.








The diagnostics tool DiagRA-LE is recommended for customers to be able to check the cars.

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2.2 Steering wheel module

The electronic steering wheel module permits activating different functions without removing hands from the steering wheel. Some buttons have double functionality.



Button	Function	Remarks
	Radio	dd Driver voice activation Maintain pushed to talk
	Full Course Yellow	4 variable* speeds (40/50/60/80) Short push to activate/deactivate
	120 limiter	Double short push to activate Single short push to deactivate
	Cockpit fan	Short push to activate/deactivate
	Change display page	Short push to change display page / rolling change
	Safety brake signal button	Allows mowing the gear lever without pressing the brake pedal. IMPORTANT: the use of this button is under user responsibility, a bad use of it may cause fatal damages on the gearbox
	Diff map change	Short push to roll diff map 1/2/3 Diff map number is shown on the AIM MXG display Map 1: Use when grip is high (new tyres or good grip) Map 2: Use when medium grip (used tyres) Map 3: Use when grip is low or rain
	Starter	Active if gearbox is in Neutral or parking modus Active if Rpm < 500
	Pit limiter	4 variable* speeds (40/50/60/80) Active if rpm > 500 and speed > 5 km/h Short push to activate/deactivate



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Button	Function	Remarks
	Drink	Activates water pump Note: pump not supplied with the car
	Rain lights	Short push to activate/deactivate
	Wiper	Short push to roll low speed/high speed/deactivate
	Windscreen water	Long push to activate water splash + wiper activation
	High beam	Short push to flash Long push to activate/deactivate
	Tip up / Tip down	A led informs when tip up or down
	CAN info	Usual status: led off If there is a CAN Bus problem: led on

Note: Although it is possible to uncouple completely the steering wheel from the column with the engine running, it is not advisable (causes fault messages on the OBD).

2.3 Speed limiter (Pit limiter/Full course yellow/120 limiter)

The speed limiter system allows limiting the car speed at a preselected value. There are five possibilities: 40, 50, 60, 80 and 120 km/h. This system is recommended for the pit lane area or Full Course Yellow (FCY) situations.

Process:

1. Select the desired speeds for each steering wheel button before starting the car and leaving the pits. Only the FCY and Pit limiter speeds are variable, the 120 limiter cannot be changed. The selected speeds are shown on the display.
2. Activate the desired speed limiter with the corresponding button. From this moment on throttle pedal may be fully pressed and the speed will be limited.
3. If the car speed is over the target, the engine torque may be cut. If the speed is below the target, torque will be applied till the speed is reached.
4. Make a short push on the selected speed limiter button on the steering wheel to deactivate the function.

Notes:

- The FCY speed can be selected between the following speeds: 40, 50, 60 and 80. The speed can only be selected with the car stopped following this process: red (+30) switch ON, yellow (+15) switch OFF, keep FCY button pushed and select the speed using the gear shift paddles. The selected speed can be seen on the AIM MXG display.
- The Pit limiter speed can be selected between the following speeds: 40, 50, 60 and 80. The speed

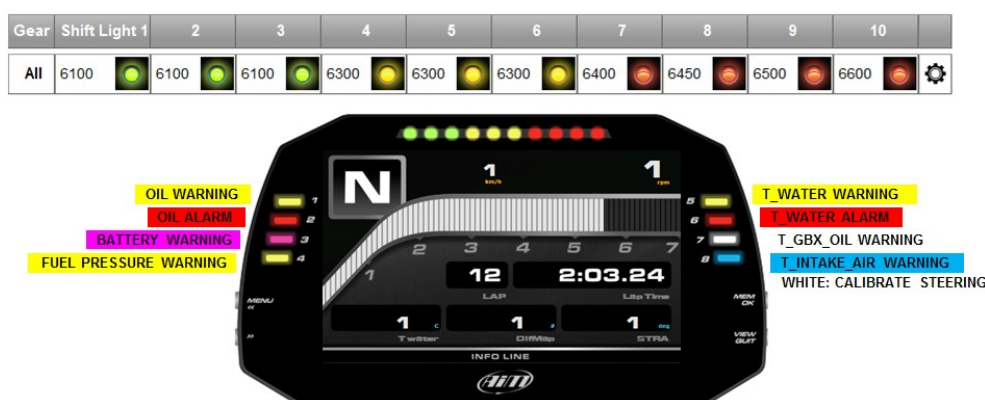


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can only be selected with the car stopped following this process: red (+30) switch ON, yellow (+15) switch OFF, keep Pit limiter/Starter button pushed and select the speed using the gear shift paddles. The selected speed can be seen on the AIM MXG display.

- Although it is possible to uncouple completely the steering wheel from the column with the engine running, it is not advisable (causes fault messages on the OBD).

2.4 Display alarms and shift lights



Alarm	Problem	Info	Safety
LED 1 yellow	Low oil pressure	Check oil level	Continue <i>if no red light appears</i>
LED 1 green	-	Left turn light is active	-
LED 2 red + pop-up	Very low oil pressure	Big risk to break turbo or engine	Slow down, drive to pitlane or stop in safe place
LED 3 purple	Low battery voltage	Check alternator and poly-V-belt	Continue
LED 4 yellow	Low fuel pressure	Check fuel level	Continue
LED 5 yellow	High water temperature	Keep an eye on the values	Continue <i>if no red light appears</i>
LED 5 green	-	Right turn light is active	-
LED 6 red	Too high water temperature	Keep an eye on the values	Continue; torque reductions will appear
LED 6 red + pop-up	Critical water temperature	Big risk to break engine	Slow down, drive to pitlane or stop in safe place
LED 7 white	High gearbox oil temperature	Drive out of slipstream, torque reductions possible	Continue
LED 8 blue	High intake air temperature	Drive out of slipstream, torque reductions possible	Keep an eye on the values and continue
LED 8 white	Steering initialization needed	Turn steering wheel left and right, alarm disappears	If alarm stays, problem in electrical steering rack
LED 1 +LED 5 red		Pit limiter is active	



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LED1+LED5 yellow		Full Course Yellow is active	
LED 1+LED 5 blue		120limiter is active	
LED 4+LED 8 green	Handbrake is locked and engine started	Unlock it before trying to move the car	
LED 4+LED 8 green + popup	Handbrake is locked while you are driving		VWMS recommends unlocking the handbrake and entering to the pit-lane to check if the rear brake calipers have been damaged



Notes:

- It is possible to customize the alarms and shift lights through the RaceStudio3 software installed on a laptop.

2.5 Gearbox functioning

The shifting gear lever enables the different gearbox modes. The features for each mode are:





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P - Parking mode:

- Use this mode to block the car by locking the transmission. Advisable for car parking in the pit lane or box area.
- It is possible to put on this P mode if the car is complete stopped and brake pedal pressed. **IMPORTANT: never try to put on P mode if the car is not completely stopped, it may cause fatal damages on the gearbox.**
- In case of brake switch malfunction, it is also possible to use the steering wheel (P) Safety brake signal button to put on or take out the P mode. **IMPORTANT: the use of this button is under user responsibility, a bad use of it may cause fatal damages on the gearbox.**
- To stop the car on track due to any technical issue, use the Neutral mode and lock manually the hand brake using the locking hook. The gearbox will not be locked, only the car due to the rear brake pressure generated by the hand brake pump.

R – Reverse mode:

- It is possible to put on this R mode if the car is complete stopped and brake pedal pressed
- In case of brake switch malfunction, it is also possible to use the steering wheel (P) Safety brake signal button to put on or take out the P mode. **IMPORTANT: the use of this button is under user responsibility, a bad use of it may cause fatal damages on the gearbox.**

N – Neutral mode:

- In N mode, it is possible to move the car pushing externally (pit lane use)

D- Automatic driving mode:

- Not advisable for race. D mode is only advisable to move the ca on the paddock zone. The gear shifting is working in low range of engine speed.

S – Automatic sportive driving mode:

- Push the gear lever once backwards when lever is in D mode to engage S mode.
- Use S mode to drive with automatic shifting. It is possible to use the steering paddles simultaneously.
- It is possible to use S mode in the standing start process. The launch control will be active and gears will shift up automatically. It is possible to change the driving mode between D, S and Tip in any moment.

Tip manual driving mode:

- Push the gear lever once to the right when lever is in D position to engage Tip mode
- The Tip mode is the most advisable for motorsport use, shifting by tipping the steering wheel paddles.
- Remember that using the Tip mode the shifting is only manual, when the engine reaches the rev limiter (6800 rpm) the power is limited but no automatic upshift will happen.
- Downshifting is protected preventing the engine from over-revs. If there is a downshift demand at too high revs the gearbox will not do it. A memory function will be save demand for one second.





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2.6 Standing start procedure (rev limiter mode)

Launch control system:

This system is automatically and only activated if wheels are absolutely stopped and the brake pedal is pressed. The throttle pedal can be fully pressed and engine speed will be limited at 4200 rpm until the car starts moving.

There are many ways to manage standing starts; following the VWMOSP recommendation is explained.

Process:

1. After the grid formation lap, stop completely the car on the grid line pushing the brake pedal
2. Gear lever has to be in S or Tip mode. If the formation lap is done using one of these modes, it is not necessary move the gear lever.
3. When the red starting lights begin, maintaining the brake pedal fully pressed, go on throttle pedal flat out. Engine will limit at 4200 rpm.
4. When the red light turns off, release the brake and control the start with the throttle pedal. Once the car starts moving the rev limiter will disappear so be careful to avoid wheel spin.

Notes:

- It is possible to start at lower engine speed without using the launch control system, just get the desired engine speed playing with the throttle pedal. Advisable not below of 3500rpm.
- Take care of the time you are using the system. The clutch and the engine may take temperature very fast. Recommendation: no more than 6 seconds of start rev limiter use.
- In case of brake switch malfunction, it is also possible to use the steering wheel (P) Safety brake launch system. After this, using the S mode, upshift is automatic.
- During testing, it is strongly recommended to do two laps between each start to cool down the clutch.

Setup launch control revs:

- Main switch on - ignition off
- Push (P)-Button continuous
- Use shift paddles to adjust revs \pm
- Launch control revs possible from 4000 up to 6500
- Value shown on page #2 of dashboard





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2.7 Drivers' tasks

- **Learning and memorizing the steering wheel buttons** placements and functions will allow drivers a faster action and will help them to keep focused on the track.
- **Warm up the engine before starting.** The minimum water temperature recommended before loading the engine is 80°C.
- **Check the brake pedal stiffness** when car is stopped or on the acceleration way.
- **Warm up tyres before attacking.** Without blankets use, the rear tyres may need 2 laps to get warm and the car is very sensitive to this.
- **Shift up gears when shift light indicates.** The shifting lights have been optimized taking into account gear ratios and engine power.
- **Shift down gears without stress.** If a downshift is required at too high revs it will be electronically rejected at it will not happen.
- **In-laps: cool down brakes and engine water** to avoid thermal shocks. Do not stop on the pit lane pressing the brake pedal when coming from the track.
- There are three different possibilities to show alarms on the display: lateral leds, messages on a red ribbon in the lower part of the screen and completely screen pop-up messages. **If a pop-up message appears is strongly recommended to stop the car on a safe place.** (oil pressure or water temperature problems).
- **If for any reason it is necessary to drop out the car on the track, leave the gearbox in neutral** to save the transmission in case of being towed.
- It is important to bed discs as follows to get their maximum life:
 - When possible **bed discs with used pads.**
 - To reduce thermal shock during bedding, the **brake ducts may be 50% taped off.**
 - **Apply the brakes gently at low speed** a few times to ensure a correct installation.
 - **Apply the brakes moderately,** (progressively up to 50% race speed, 25% race pressure), for 10-20 applications to ensure above 80% pads face contact with disc. The contact with the disc face is particularly important at the inner swept area. The first time a driver gets used to bedding discs on a car it is worthwhile getting him to return to the pits to check contact is sufficient before preceding to the next step.
 - **Progressively build up to about 70% of race speed and 50% of race pressure.** Then apply brakes for approximately 25 applications. Progressively start reducing again the brake pressure cooling down the brakes slowly during the in lap. Do not just stop braking because this can produce a very fast cooling and cause cracks because of thermal shocks.
 - When returning to the track, come up progressively to race speed and pressure.





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3. ELECTRONICS

3.1 AIM MXG

MXG is the AIM dash-logger designed to acquire and display in FHD data coming from your ECU, the internal accelerometer and gyro, as well as from the GPS module, analog/digital inputs and predefined math channels. Performance and data acquired can also be incremented adding expansion modules. Using the specific AIM on-board camera SmartyCam it is possible to overlay on videos the data sampled by the logger.

Downloading data can be done through a data download cable, a memory stick or using the available Wi-Fi features.

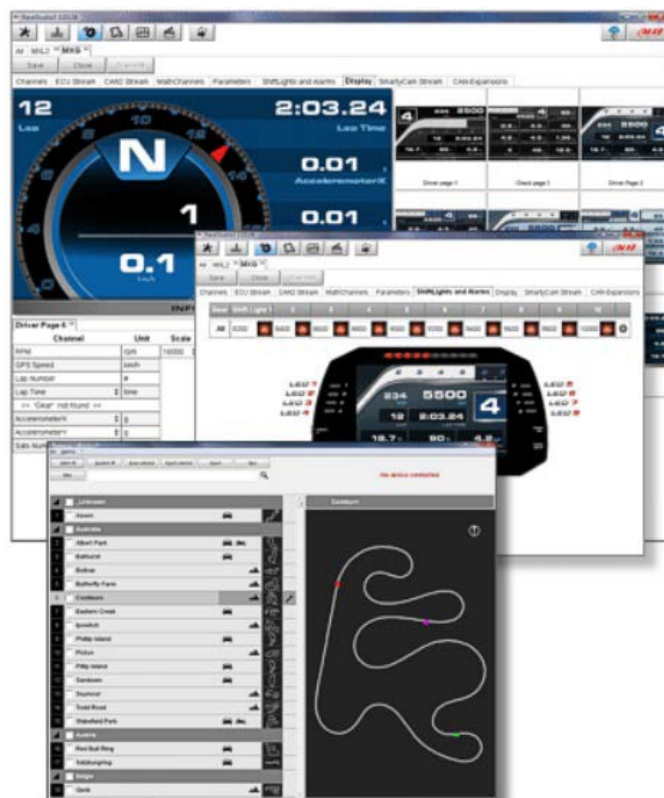
To enable "lap time" it's necessary to insert the track where you are running. Track load has to be done by **GPS Manager** available at the **RaceStudio3** software.

RaceStudio3 software, latest **MXG firmware** and documentation available on AIM website:

<http://www.aim-sportline.com/eng/download/index.htm>

MXG user guide available on AIM website:

http://www.aim-sportline.com/download/doc/eng/mxs-mxg/MXG_user_guide_101.pdf





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Shift lights and alarms:

1. On the top of the display there are ten gear flash leds that can be freely configured. The rpm value at which to turn it on and the colour can be defined. Gear dependent lights can be also defined.
2. On both sides of the screen there are eight alarm leds that can be freely configured. The conditions to turn them on and off and the colour can be defined. Also messages on a red ribbon in the lower part of the screen and completely screen pop-up messages can be defined.



Notes:

- **IMPORTANT:** the change of the alarms or shift lights is under user responsibility. Car is delivered with VWMOSP recommendation. Before changing them it is advisable to do a backup of the standard configuration.

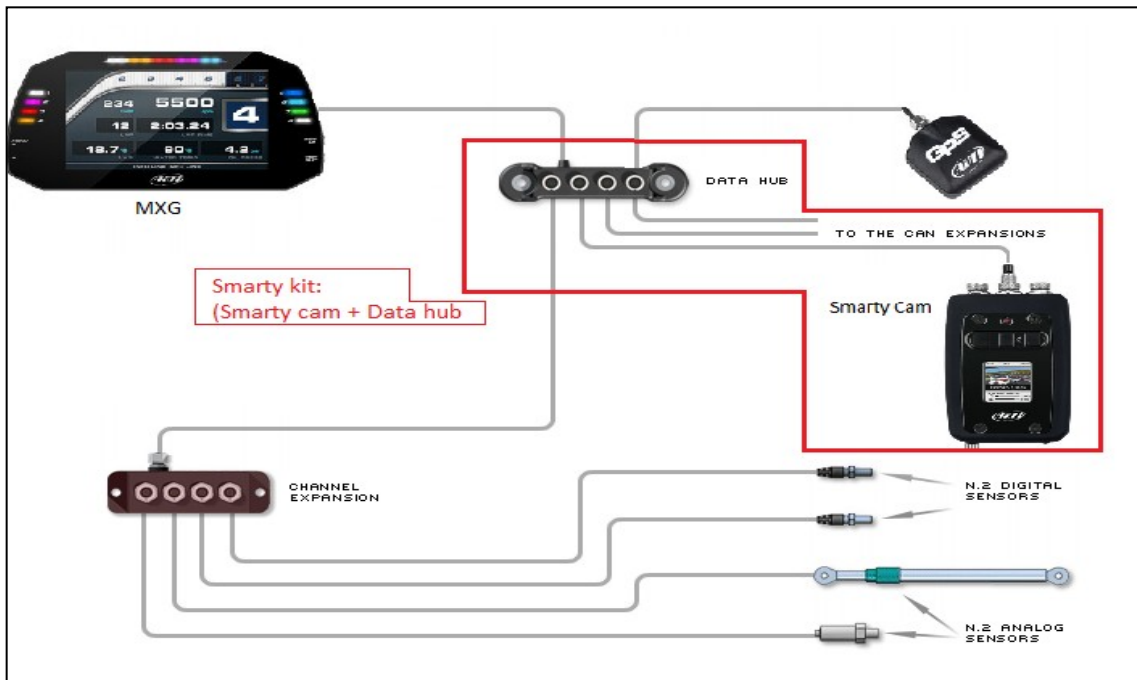
3.2 MXG connection schemes:



Data-logger standard connection scheme (car delivery)



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Data-logger connection scheme with Smarty-cam and expansion module

Features	Remarks
Lap-trigger	The MXG system uses only GPS signal.
Circuit	Through the RaceStudio3 software is possible to activate all the circuits in the world. It is also possible to create and load a new circuit.
Extra sensors	In case of adding extra sensors, they have to be connected to an expansion module. This expansion module has to be connected through the data hub as shown in the scheme 2.

Notes:

- Channel expansion module and sensors are available through AIM dealers, not VWMOSP.
- If for any reason it is necessary to send data acquisition files to VWMOSP, following data file extensions must be sent: .drk, .bak, .gpk, .rrk and .xrk.



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3.3 Data acquisition

AIM-MXG channel list:

Channel name	Description	Unit	Recommended scale
P_TURBO	Boost pressure	bar	0 ... 3
T_ENG_AIR	Intake air temperature	°C	20 ... 70
T_ENG_OIL	Engine oil temperature	°C	80 ... 150
T_ENG_WATER	Engine coolant temperature	°C	70 ... 125
T_AIR	External air temperature	°C	12 ... 45
RPM_ENG	Engine speed	rpm	1000 ... 7000
FLAG_BRAKE	Brake lights	on/off	0 ... 2
P_BRK_FRONT	Front brake pressure	bar	0 ... 100
P_BRK_REAR	Rear brake pressure	bar	0 ... 100
BRK_BALANCE	Brake Balance	%	0 ... 100
P_ENG_OIL	Engine oil pressure	bar	1,5 ... 5
P_ENG_FUEL	Fuel low pressure	bar	0 ... 7
FUEL_LEVEL	Fuel level	dm ³	0 ... 110
FUEL_CONS	Fuel consumed	dm ³	0 ... 110
S_FUEL	Fuel remaining time	min	0 ... 120
N_FUEL	Fuel remaining laps	#	0 ... 80
LAP_CONS	Fuel lap consumption	dm ³ /lap	0 ... 3
POS_PEDAL	Gas pedal position	%	0 ... 100
TIP_DOWN	Tip down	Sign	0 ... 2
TIP_UP	Tip up	Sign	0 ... 2
G_CH_Y	Lateral acceleration	G	-2,5 ... 2,5
G_CH_X	Longitudinal acceleration	G	-1,6 ... 1,6
W_CH	Yaw rate	°/s	-50 ... 50
V_WHL_RL	RL wheel speed	km/h	0 ... 260
V_WHL_RR	RR wheel speed	km/h	0 ... 260
V_WHL_FL	FL wheel speed	km/h	0 ... 260
V_WHL_FR	FR wheel speed	km/h	0 ... 260
V_WHL_REF	ESP reference speed	km/h	0 ... 260
A_STE	Steering angle	°	-200 ... 200
V_STW_LIMIT	Pit limiter speed	km/h	20 ... 100
A_STW_FCY	Full course Yellow Speed	Km/h	20....120
FLAG_STW_OUT1	Steering wheel button state	#	0 ... 8
FLAG_STW_OUT2	Steering wheel button state	#	0 ... 8
FLAG_STW_OUT3	Steering wheel button state	#	0 ... 8
FLAG_FBX_F5	Fuse state 5	#	0 ... 8
FLAG_FBX_F4	Fuse state 4	#	0 ... 8
FLAG_FBX_F3	Fuse state 3	#	0 ... 8
FLAG_FBX_F2	Fuse state 2	#	0 ... 8
FLAG_FBX_F1	Fuse state 1	#	0 ... 8
I_FBX_MAIN	Main current	A	10 ... 40
I_FBX_TURNLIGHT	Turnlight current	A	0 ... 10
External Voltage	Battery Voltage	V	11 ... 14,5
POS_GBOX	Gearbox position	#	0 ... 14





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N_DSG_GEAR	Gear	#	0 ... 8
POS_GEAR_LEVER	Gear lever position	#	0 ... 14
T_DSG_OIL	Gearbox oil temperature	°C	80 ... 145
POS_DIF_MAP	Diff map position	#	1 ... 3
T_DIF_LAMELLA	Diff temperature	°C	80 ... 145
I_DIF_PUMP	Diff current consumption	A	0 ... 10
TORQ_DIF_REF	Requested diff torque	Nm	0 ... 2000

GPS channels	Description	Unit
GPS_Speed	Speed	km/h
GPS_Nsat	Nº of satellites	#
GPS_LatACC	Lateral acceleration	G
GPS_LonACC	Longitudinal acceleration	G
Altitude		m
Luminosity	Display brightness	%
Odometer		km

The values shown in the following table are the standard approximate values at 20°C air temperature for main car control channels.

Channel	Idle speed*	Values at T _{air} 20°C	Maximum value**
P_TURBO	0 bar	2.7 bar	2.99 bar
P_ENG_FUEL	4.1 bar	4.3 bar	6 bar
P_ENG_OIL	2 bar	3.6 bar	5 bar
T_ENG_AIR	40°C	42°C	>75°C
T_ENG_OIL	80°C	122°C	>145°C
T_ENG_WATER	90°C	92°C	>115°C
T_DSG_OIL	40°C	120°C	>142°C

Notes:

- * These values can change depending on car's engine temperature. Those are approximate values when T_{ENG_WATER} is 90°C after having warmed the car from cold always at idle speed.
- ** The maximum value underlined in orange shows the value before performance restrictions or protection modes are applied.





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3.4 Fusebox

The fusebox is an electronic box that controls the power supply to practically all devices. Internally, the thermal fuses reset automatically, so changing a fuse will never be necessary. In case of malfunction it has to be sent to VWMOSP. It is also possible to check if a fuse has blown in the fusebox, so you will know if the current or signal was sent.

There are three ways to check the correct functioning:

- **Live measures** view in RaceStudio3.
- **Checking** the fusebox **control channels** in Race Studio Analysis.
- **Checking** the red **LEDs** on the fusebox.

If a malfunction is detected, it is necessary to control the corresponding wiring or the device.



- Lbda
- Eng. Acc.
- Injectors
- Ign Coils
- Gbox Elv
- Gbox Pump
- Eng. ECU
- Fuel P.
- Starter
- Radio
- Drink
- Aux
- St Wheel
- GB/Lever
- Diag.
- PW Steer.
- Eng. Ecu
- Front Fan
- MXG
- BB/GW

○

- Aux +15
- Ckpit Fan
- Window
- Free
- UAQ
- Aux +30
- DSG
- Elv ABS
- Wiper
- Transp.
- Sig. +15
- Wiper P
- Brake
- High Beam
- Day Light
- Low Beam
- Rear
- Rain L
- Rain R

In the following table is shown the fuse analysis information:

- **Channel name:** There are 5 channels to analysis.
- **Bit number:** Each channel is able to control 8 fuses.
- **Data value:** Is the value you can check on data acquisition
-

Channel name	Bit number	Data value	Description
FLAG_FBX_F5	bit8	-----8	Sadev pump
	bit7	-----7-	HR-ECU
	bit6	-----6--	HR-Fuel pump
	bit5	----5---	Starter
	bit4	---4----	Radio
	bit3	--3-----	HR-Lambda
	bit2	-2-----	HR-Miscellaneous
	bit1	1-----	HR-Injectors





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FLAG_FBX_F4	bit8	-----8	MR-ignition coils
	bit7	-----7-	Sadev-ELV
	bit6	-----6--	Drink
	bit5	----5---	Switch Panel / Aux. Data connector
	bit4	---4----	Steering Wheel
	bit3	--3-----	Gear Lever / GCU
	bit2	-2-----	Diagnosis Connector
	bit1	1-----	Power steering ECU
FLAG_FBX_F3	bit8	-----8	ECU
	bit7	-----7-	Front Fan
	bit6	-----6--	MXG
	bit5	----5---	Blackbox / Gateway
	bit4	---4----	Differential
	bit3	--3-----	+30 Aux. connector
	bit2	-2-----	DSG
	bit1	1-----	ABS ELV
FLAG_FBX_F2	bit8	-----8	Wiper
	bit7	-----7-	Turn light
	bit6	-----6--	Diagnosis Connector / +15 Aux con.
	bit5	----5---	Cockpit fan
	bit4	---4----	Window
	bit3	--3-----	not used
	bit2	-2-----	Transponder
	bit1	1-----	+15 signal
FLAG_FBX_F1	bit8	-----8	Wiper pump
	bit7	-----7-	Brake light
	bit6	-----6--	High beam
	bit5	----5---	Day light
	bit4	---4----	Low beam
	bit3	--3-----	Rear light
	bit2	-2-----	Rain light left
	bit1	1-----	Rain light right

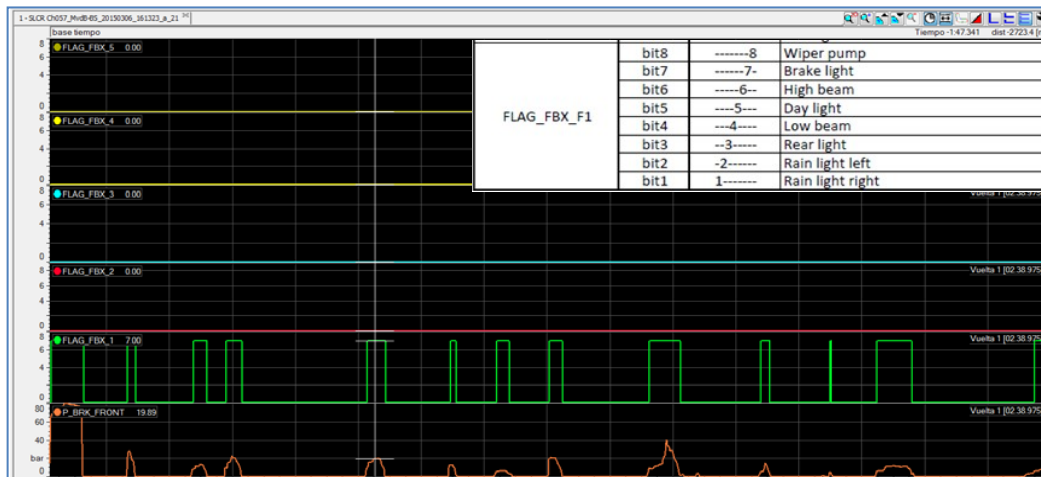


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Channel name	Bit number	Data value	Description
FLAG_FBX_RELAY 2	bit8	-----8	
	bit7	-----7-	
	bit6	-----6--	Turn light L
	bit5	----5---	Turn light R
	bit4	---4----	Cockpit fan
	bit3	--3-----	M relay
	bit2	-2-----	H relay
	bit1	1-----	Starter
FLAG_FBX_RELAY 1	bit8	-----8	Drink
	bit7	-----7-	Wiper pump
	bit6	-----6--	Brake light
	bit5	----5---	High beam
	bit4	---4----	Rain light
	bit3	--3-----	Low beam
	bit2	-2-----	+15 signal
	bit1	1-----	Turn light

Example:

- In the acquisition screenshot bellow is shown the channel "FLAG_FBX_1" in green. The value is "7" when braking and 0 when no braking. In this case, the conclusion is that there is a problem on the brake light line.



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3.5 Fuel level display

All new VW Golf GTI TCR cars have a fuel display to control the fuel remaining at the tank. It is tied to the roll cage in the rear right door area. The display has to be set after each refueling. This setting is very important to get the correct fuel level because it is calculated by the fuel consumption sent from the engine ECU.

- There is a light sensor for automatic brightness trimming.
- Two sensitive zones below the four digits allow menu navigation.
- It is important not to touch the front panel when it is switching on due to the initial capacitance setting during start up.
- Also take special care wiping with hand the front panel if device is switched on.
- Electrostatics charge could affect the sensitive touch and set undesired actions.



Terminology:

Following, the terminology description to understand future command tables:

- **Llp:** Left long push (>1s)
- **Rlp:** Right long push (>1s)
- **Lsp:** Left short push (<1s)
- **Rsp:** Right short push (<1s)
- **STout:** Short Timeout (1s)
- **LTout:** Long Timeout (8s)

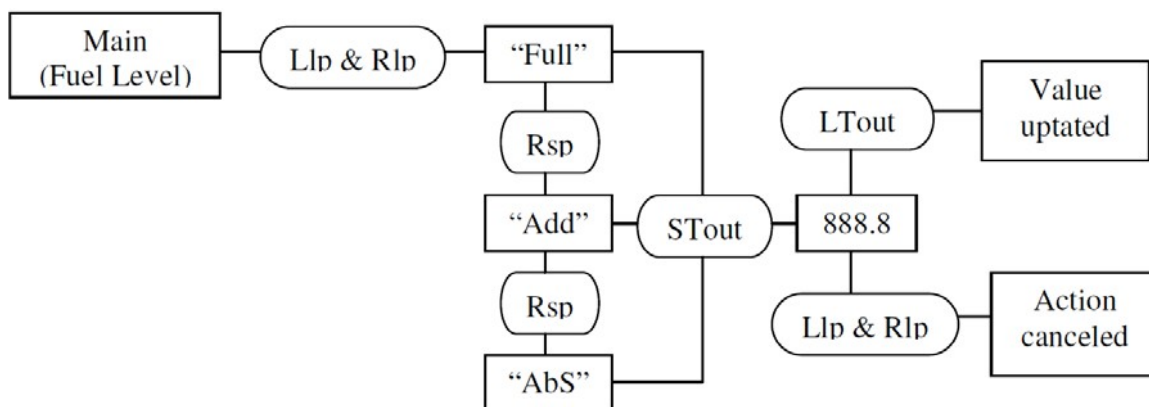


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Fuel level adjustment:

This menu allows the following possibilities:

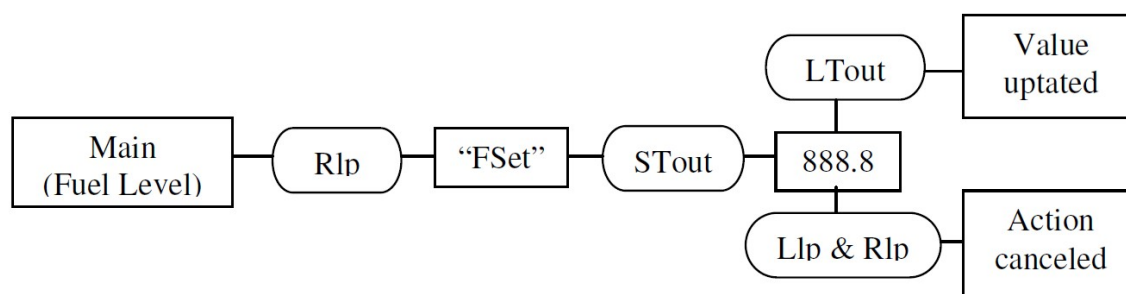
- Set fuel level to full tank value.
- Add/remove a fuel quantity to the actual value.
- Set an absolute quantity (litres without decimal).



- When the value is shown (and blinking), a right short push increases this value litre by litre and a left short push decreases this value.
- Maintaining right/left long push, the value is increased/decreased 10 litres by 10litres.

Set Full level value:

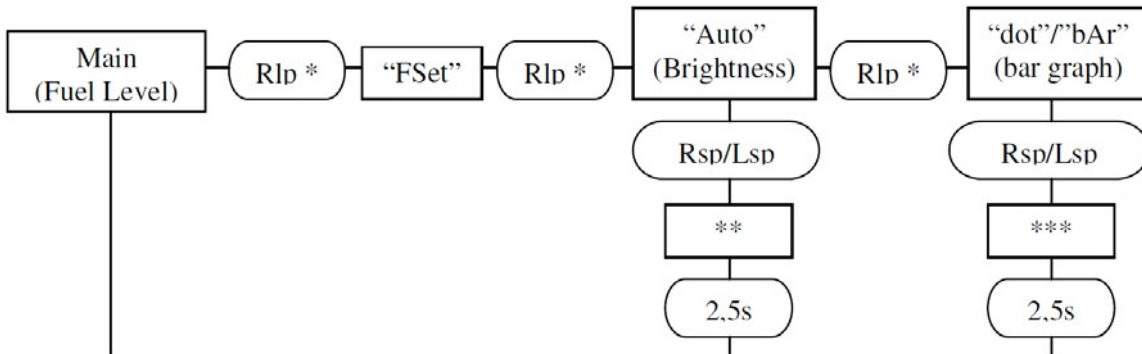
This menu allows setting the maximum tank level or predefined fuel level.



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Brightness and bar graph set:

It is possible to modify the brightness and bar graph settings.

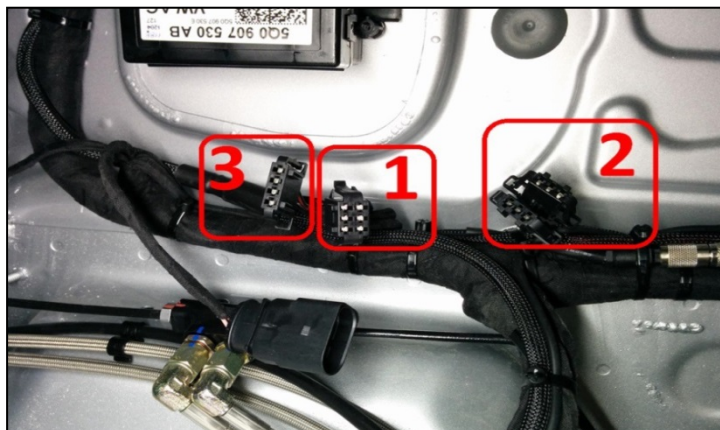


- * Long left push will scroll menu on the other side.
- ** "Auto" will adjust automatically the brightness. Else, use right / left touch to increase / decrease light level.
- *** "dot" mode will light on only one LED on the bar graph. "bar" mode will light on all LEDs beginning from the left side up to the level point. Note that the last LED matches with the full value set.

3.6 Auxiliary connectors

The main car wiring loom is prepared with some auxiliary connectors to make easier the connection of auxiliary devices.

Free connectors inside the cockpit



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#1: Auxiliary power supply

This connector is placed in the driver cockpit above the central tunnel (front). It could be used for user requirements such as connecting the TCR scrutineering EVO4 logger.

Auxiliary power supply		
Matching connector		191 972 733
Pin-out		Terminal
1	+30 up to 8A	FS 2,8 x 0,8 (*)
2	GND	FS 2,8 x 0,8 (*)
3	CAN H traction	FS 2,8 x 0,8 (*)
4	CAN L traction	FS 2,8 x 0,8 (*)
5	CAN H chassis	FS 2,8 x 0,8 (*)
6	CAN L chassis	FS 2,8 x 0,8 (*)



#2: Auxiliary analogic sensors

Two connectors are available connected to the dash logger.

Auxiliary analogic sensors		
Matching connector		191 972 713
Pin-out		Terminal
1	5v	FS 2,8 x 0,8 (*)
2	signal	FS 2,8 x 0,8 (*)
3	GND	FS 2,8 x 0,8 (*)

#3: Additional power supply

It can be used for any requirement.

Additional power supply		
Matching connector		1J0 972 714
Pin-out		Terminal
1	+30 up to 8A	FS 2,8 x 0,8 (*)
2	+15 up to 5A	FS 2,8 x 0,8 (*)
3	GND	FS 2,8 x 0,8 (*)
4	GND	FS 2,8 x 0,8 (*)



Radio and drink

Behind the driver seat there are two free connectors associated with the steering wheel module. Connecting here the radio and drinking systems, both can be handled through the steering wheel module

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Drink connector		
Matching	AMP Super-seal 2-way 282104-1	
Pin-out	Terminal	
1	up to 2.5A	183036-1
2	GND	183036-1

Radio connector		
Matching connector	AMP Super-seal 4-way 282106-1	
Pin-out	Terminal	
1	PTT	183024-1 or 183036-1
2	PTT	183024-1 or 183036-1
3	+30 up to 8A	183024-1 or 183036-1
4	GND	183024-1 or 183036-1



Power supply cut:

There is a fusebox power supply connector, so in case of disconnection cuts all devices power supply.

You can unplug it in case of transport or for a most safety disconnection in case of workshop big jobs.

See connector placement close to the fusebox main connectors on the picture beside.

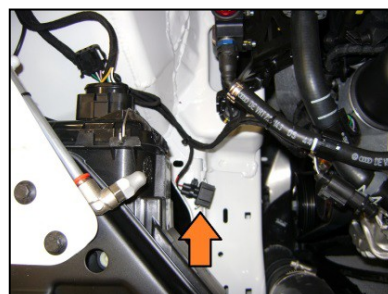


Free connectors on the engine bay

Transponder:

This auxiliary connector is placed next to the right front headlight. All VW TCR cars are provided without transponder.

Transponder		
Matching connector	357 972 762	
Pin-out	Terminal	
1	12v	FS 2,8 x 0,8
2	GND	FS 2,8 x 0,8



Additional headlights:

This auxiliary connector is placed behind the left front headlight, under the engine ECU. All Audi RS 3 LMS cars are provided without additional headlights but this connector is ready for a plug and play solution that allows the driver to turn additional headlights from the steering wheel.

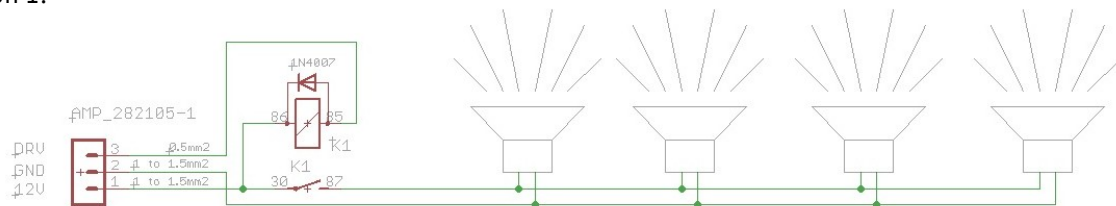
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Additional headlights		
Matching connector	AMP Super-seal 3-way 282105-1	
Pin-out	Terminal	
1	up to 2.5A	AMP 183024-1
2	GND	AMP 183024-1
3	signal	AMP 183024-1



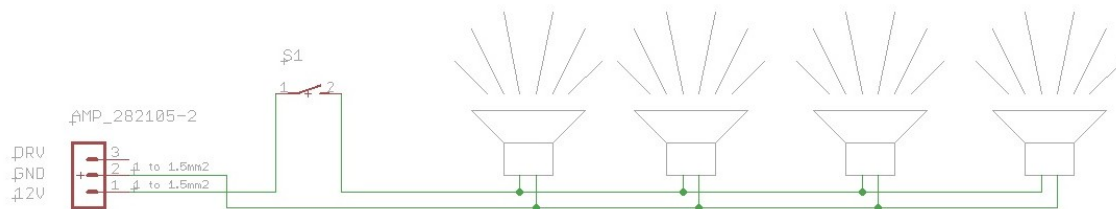
Following two recommended solutions to install the headlights electrically:

Option 1:



Notes:

- Total maximum current 7 A.
- Mandatory to install a maximum 100 mA coil current relay. TE 3-1414773-5 recommended.
- Mandatory to install a freewheel diode on relay's coil.
- When using the DRV signal pin, the headlights will switch on together with the standard high beam when pushing the steering wheel dedicated button.



Option 2:

Notes:

- Total maximum current 7 A.

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3.7 Fire extinguisher

All VWMS TCR cars are delivered with an OMP fire extinguisher placed on the boot area. Fulfilling all FIA safety regulations, the extinguisher can be detonated from the cockpit area using the push button of the control box placed in the main console or from the outside by a switch on the lowest part of the windscreen.

The extinguisher is equipped with the mandatory anti-torpedo bracket bolted to the chassis.



Notes:

- Check the inner press bottle periodically. It has to be in the green area.
- Check periodically that the 9V inner battery is in good condition
- Do not forget to toggle ON the control box switch before sending the car on the track



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4 SETTING ADJUSTMENTS

4.1 Standard set-up

VW Golf GTI TCR		Standart SET-UP		Volkswagen	
CAR INFORMATION		TRACK INFORMATION		DATE	2019
Chassis		Circuit		FROM	
Engine		Lenght		TO	
Gearbox		Driver			
CAR CONFIGURATION		FRONT	REAR	POWER TRAIN	
*RIDE HEIGHT		83	123	ENGINE	
MEASUREMENT POINT		Front subframe	Rear subframe	RPM MAX	6600
DAMPERS BILSTEIN V1		FRONT	REAR	HP	340
MAIN SPRING		170/60/110	170/60/90		325
TENDER		60/60/2	60/60/2	TRANSMISSION	
ASSEMBLY LENGHT				Gear	Ratio
DAMPER ON UPRIGHT		0 mm	-	1	13//38
BUMP STOP		20 mm (5000 N/4 mm)	35 mm (5000 N/4 mm)	2	22//45
BILSTEIN V1	BUMP	5	5	3	28//41
	REBOUND	5	5	4	38//41
ANTI-ROLL BARS		FRONT	REAR	5	32//35
TYPE		22x3	22x3	6	38//35
POSITION		M - M	M - M	cwp 1-4	15//72
WHEELS		FRONT	REAR	cwp 5-6	20//72
RIM		18" x 10" ET36		DIFFERENTIAL VAQ	
SPACER		-	-	DIFF MAP	3
**TYRES					
HOT TYRE PRESSURE		2,0	2,0	HAND BRAKE	
BRAKES		FRONT	REAR	MASTER CYLINDER	AP Racing 15 mm
MASTER CYLINDER		AP Racing 19,1 mm	AP Racing 20,6mm		
BRAKE PADS		PAGID RST 3	PAGID RS 4-4	WEIGHT	
BRAKE DISCS		378 x 34	VAG 272x10	DRIVER	
PRESSURE RELATION		15/12	Valve Pos.3	FUEL	
AERO				FRONT	
WING POSITION		0°		LEFT	RIGHT
				TOTAL	
ALIGNEMENT		FRONT			
		LEFT	RIGHT	REAR	
CAMBER		4.5°	4.5°		TARGET (no fuel)
TOE std. ride height (mm)		1,00 mm OUT	1,0 mm OUT	FRONT	%
				REAR	%
		REAR		CROSS	
CAMBER		4.0°	4.0°	LEFT	
TOE std. ride height (mm)		0 mm	0 mm		

Notes:


- This is also the car delivery set-up. Due to production issues, small changes on this set-up sheet may occur. VWMS recommends doing your own check.
- The use of ballast as fuel weight during set-up process is recommended to ensure the cross weights.





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4.2 Rain set-up


VW Golf GTI TCR		Rain SET-UP		 Volkswagen	
CAR INFORMATION		TRACK INFORMATION		DATE	2019
Chassis		Circuit		FROM	
Engine		Lenght		TO	
Gearbox		Driver			
CAR CONFIGURATION		FRONT	REAR	POWER TRAIN	
*RIDE HEIGHT	83	123		ENGINE	
MEASUREMENT POINT	Front subframe	Rear subframe		RPM MAX	6600 Refect
DAMPERS BILSTEIN V1	FRONT	REAR		HP	340 325
MAIN SPRING	170/60/100	170/60/80		TRANSMISSION	
TENDER	60/60/2	60/60/2		Gear	Ratio Vmax
ASSEMBLY LENGHT				1	13//38 0,071 57,63
DAMPER ON UPRIGHT	0 mm	-		2	22//45 0,102 82,36
BUMP STOP	20 mm (5000 N/4 mm)	35 mm (5000 N/4 mm)		3	28//41 0,142 115,05
BILSTEIN V1	BUMP	5	5	4	38//41 0,193 156,14
	REBOUND	3	3	5	32//35 0,254 205,37
ANTI-ROLL BARS	FRONT	REAR		6	38//35 0,302 243,88
TYPE	22x3	22x3		cwp 1-4	15//72
POSITION	W - W	W - W		cwp 5-6	20//72
WHEELS	FRONT	REAR		DIFFERENTIAL VAQ	
RIM	18" x 10" ET36			DIFF MAP	3
SPACER	-	-			
**TYRES				HAND BRAKE	
HOT TYRE PRESSURE	2,0	2,0		MASTER CYLINDER	AP Racing 15 mm
BRAKES	FRONT	REAR			
MASTER CYLINDER	AP Racing 19,1 mm	AP Racing 20,6mm		WEIGHT	
BRAKE PADS	PAGID RST 3	PAGID RS 4-4		DRIVER	
BRAKE DISCS	378 x 34	VAG 272x10		FUEL	
PRESSURE RELATION	15/12	Valve Pos.3		FRONT TOTAL	
AERO				LEFT	RIGHT 0
WING POSITION	0°			REAR TARGET (no fuel)	
ALIGNMENT				FRONT	% CROSS
	FRONT			REAR	% LEFT
	LEFT	RIGHT			
CAMBER	4.2°	4.2°			
TOE std. ride height (mm)	1,00 mm OUT	1,0 mm OUT			
	REAR				
CAMBER	3.8°	3.8°			
TOE std. ride height (mm)	0 mm	0 mm			





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4.3 Nürburgring set-up

VW Golf GTI TCR		Nürburgring SET-UP		 Volkswagen	
CAR INFORMATION		TRACK INFORMATION		DATE	2019
Chassis		Circuit		FROM	
Engine		Length		TO	
Gearbox		Driver			
CAR CONFIGURATION		FRONT	REAR	POWER TRAIN	
*RIDE HEIGHT	83	123		ENGINE	
MEASUREMENT POINT	Front subframe	Rear subframe		RPM MAX	6600 Refect
DAMPERS BILSTEIN V1	FRONT	REAR		HP	340 325
MAIN SPRING	170/60/100	170/60/80		TRANSMISSION	
TENDER	40/60/30	40/60/20		Gear	Ratio Vmax
ASSEMBLY LENGTH				1	13//38 0,071 57,63
DAMPER ON UPRIGHT	-10 mm	long top eye*		2	22//45 0,102 82,36
BUMP STOP	20 mm (5000 N/4 mm)	35 mm (5000 N/4 mm)		3	28//41 0,142 115,05
BILSTEIN V1	BUMP	5	5	4	38//41 0,193 156,14
	REBOUND	5	5	5	32//35 0,254 205,37
ANTI-ROLL BARS	FRONT	REAR		6	38//35 0,302 243,88
TYPE	22x3	22x3		cwp 1-4	15//72
POSITION	M - M	M - M		cwp 5-6	20//72
WHEELS	FRONT	REAR		DIFFERENTIAL VAQ	
RIM	18" x 10" ET36			DIFF MAP	3
SPACER	-	-			
**TYRES				HAND BRAKE	
HOT TYRE PRESSURE	2,1	2,1		MASTER CYLINDER	AP Racing 15 mm
BRAKES	FRONT	REAR			
MASTER CYLINDER	AP Racing 19,1 mm	AP Racing 20,6mm		WEIGHT	
BRAKE PADS	PAGID RST 3	PAGID RS 4-4		DRIVER	
BRAKE DISCS	378 x 34	VAG 272x10		FUEL	
PRESSURE RELATION	15/12	Valve Pos.3		FRONT TOTAL	
AERO				LEFT	RIGHT
WING POSITION	0°			REAR TARGET (no fuel)	
ALIGNMENT				FRONT	
	FRONT			REAR	
	LEFT	RIGHT		FRONT	
CAMBER	4.0°	4.0°		LEFT	RIGHT
TOE std. ride height (mm)	1,00 mm OUT	1,0 mm OUT		TOTAL	
	REAR			0	
CAMBER	3.5°	3.5°		REAR	
TOE std. ride height (mm)	0 mm	0 mm		TARGET (no fuel)	
				FRONT	
				FRONT	% CROSS
				REAR	% LEFT

*available at Bilstein





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4.4 Steering rack centering

As the steering rack is electric, the steering angle sensor has to be electronically aligned with the wheels at the aligning time.

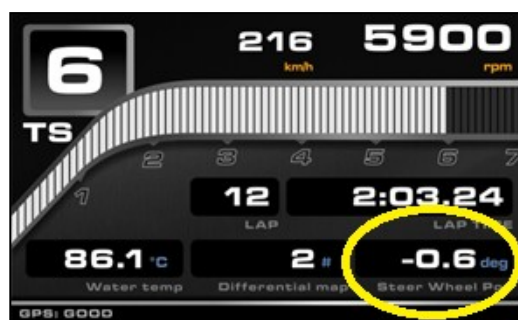
How to proceed to align the steering angle sensor:

It is necessary fix the steering wheel. To do it, you can use straps fixed between the roll cage and the steering wheel or other kind of standard tools.

The use of a rack centering stopper tool is not recommended because it is difficult to get the steering angle sensor at 0 deg. The most important is to obtain the toe alignment with the sensor at 0 deg.

Proceed as following:

- Switch on main and ignition switches.
- Turn left and right to get the steer angle signal initialized.
- Fix the steering wheel when the steer angle is 0 deg.
- Switch off the ignition and main.
- Proceed now with the alignment jobs.



Notes:

- With this process the steering angle signal will be 0 deg with the wheels aligned. This is very important for the steering assistance and for the electronic slip differential behavior.

4.5 Front camber and toe adjustments

The front suspension is very special on this car due to its kinematic characteristics. To reach the front suspension set-up value is recommended to proceed as following:

1. Car ride height: put the ride height at your choice through damper/spring adjustments.
2. Camber: to change the camber is recommended to move the steering rack arm first. The camber will change quickly.
3. Toe: to change the toe enlarge or reduce the wishbone adjustment.
4. Check: adjust a second time if necessary.

Notes:

- Although this process seems strange, it is the best and faster way to obtain the camber and toe adjustments.

Front wishbone adjustment:

Underneath the front wishbone there is a bolt to control the adjustment movement. Unlock the four screws that are fixing the camber regulator plate and proceed to the adjustment.



Notes:

- After any intervention, fix the wishbone regulator plate bolts in the right tighten.





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- Maintain the wishbone regulation plate clean and little oiled between plates.

Camber	Toe regulation	Wishbone regulation 1,5 turns = 10' camber
-5,8°	9,5 turns	12 turns
-5,5°	7 turns	8,3 turns
-5°	3,5 turns	4,5 turns
-4,5°	0	0
-4°	-3,5 turns	-4 turns
-3,8°	-6 turns	-7 turns

Notes:

- Take care with the maximum and minimum camber. Although physically the camber adjuster can reach higher values, it is not recommended due the drive shaft limitations.

4.6 Rear camber and toe adjustment

To reach the rear suspension set-up value is recommended to proceed as following:

1. Car ride height: put the ride height at your choice through damper/spring adjustments.
2. Camber: to change the camber is recommended to move the "boomerang" arm.
3. Toe: to change the toe enlarge or reduce the rear arm.
4. Check: Adjust a second time if necessary.



Notes:

- The rear camber regulation does not have relation with the toe movement, so it is possible to change rear camber without any toe movement.
- After the camber adjustment job, check that the ball-joint is placed in the middle of its housing.

Camber	Arm regulation
-2°	1,5 turns
-2,5°	1 turns
-3°	0,5 turns
-3,5°	0
-4°	-0,5 turns
-4,5°	-1 turns
-5°	-1,5 turns





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4.7 Suspension

To set-up the suspension, the following spring range can be used in both front and rear axles:

Springs	N/mm	Remark
170-60-120	120	
170-60-110	110	Car delivery front
170-60-100	100	
170-60-90	90	Car delivery rear
170-60-80	80	
170-60-70	70	

Risk of Coil binding:

Situation

The Golf GTI TCR is delivered with 170mm long main springs. With those springs an unlucky combination of setup values can lead to coil binding of the main springs. Coil binding means that the coils are in contact to the next upper and lower coil when reaching the maximum designed travel (block length). This should be avoided on the main springs as it could lead to spring failure or at least to a loss of length and/or rate. The most helper springs are designed to be used in block situation.

Which parameters have influence?

Following summarized the parameters which can be adjusted and have an influence on the safety of the spring length:

- Ride Height
- Springs (rate, block length)
- Damper Type (compressed length, stroke, gas pressure)

Do I have a safe spring setup?

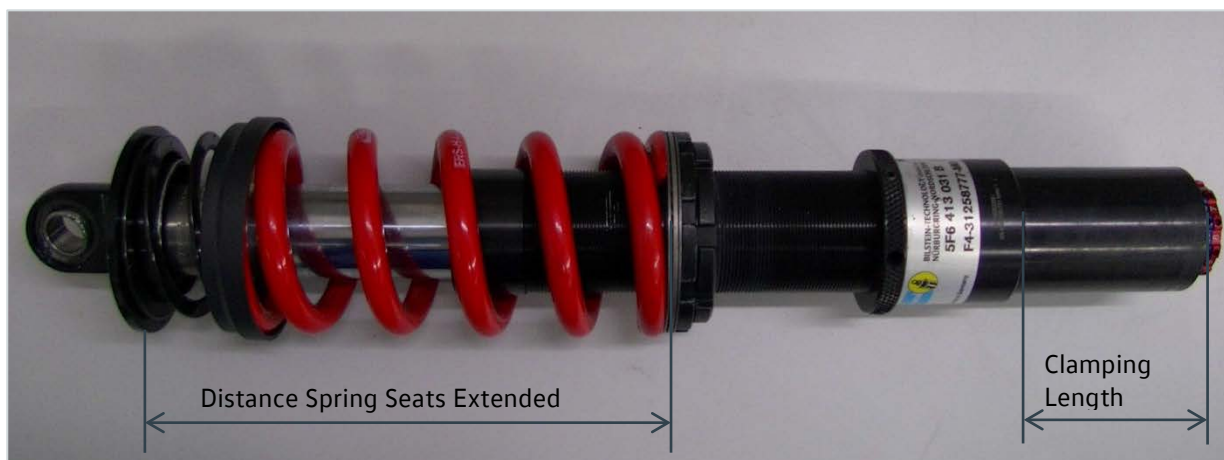
In general the limit can be defined with the value of „Minimum Distance Spring Seats Extended“, if following values are known:

- + Main Spring Block Length
- + Helper Spring Block Length
- + Spring Separator Height
- + Damper Stroke

The setup is safe, if the distance of the spring seats on the extended damper is higher than the addition of the values above.



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The table below is showing a few examples of calculated values for „Minimum Distance Spring Seats Extended“ with different main springs.

Main Spring Type (Eibach)	-	170-Ø60-80	170-Ø60-90	170-Ø60-100	170-Ø60-110	170-Ø60-140	170-Ø60-160
Main Spring Block Length	mm	63.8	69	68.7	69	77.4	80.3
Helper Spring Type (Eibach)	-	60-Ø60-2	60-Ø60-2	60-Ø60-2	60-Ø60-2	60-Ø60-2	60-Ø60-2
Helper Spring Block Length	mm	12.5	12.5	12.5	12.5	12.5	12.5
Spring Separator Height	mm	2	2	2	2	2	2
Damper Stroke (Bilstein V1 Front)	mm	107	107	107	107	107	107
Min Distance Spring Seats extended front	mm	185.3	190.5	190.2	190.5	198.9	201.8
Damper Stroke (Bilstein V1 Rear)	mm	117.5	117.5	117.5	117.5	117.5	117.5
Min Distance Spring Seats extended rear	mm	195.8	201	200.7	201	209.4	212.3

My spring setup is not safe. What can I do?

- Decrease the ride height
- Reduce bump travel
 - o On the front the bump travel can be reduced by decreasing the clamping length of the damper inside the strut (see also picture above) by changing the position of the "upright height adjuster". As this will also increase the ride height, the lower spring seats can be screwed down the same amount.
 - o On the rear for the standard Bilstein damper a longer rod end is available (longer compressed length -> less bump travel with same ride height). Please contact Bilstein for more information.
- Use longer springs (i.e. 200mm long)

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Example of unsafe area

Front:

When using the standard Bilstein damper with the "upright height adjuster" in position zero with the delivered 170-Ø60-110 main and 60-Ø60-2 helper spring the setup is safe at a ride height (splitter/subframe clearance) up to about 70mm. If a ride height of 80mm is needed the clamp length has to be reduced by 10mm. For a ride height higher than 80mm a longer spring would be necessary.

Rear:

When using the standard Bilstein damper with the delivered 170-Ø60-90 main and 60-Ø60-2 helper spring (Eibach) the setup is safe at a ride height (at subframe) up to about 118mm. For a ride height higher than 118mm a longer spring or longer rod end would be necessary.

4.8 Dampers

Front dampers
Aluminium outer housing Bilstein damper
2-way adjustable with 10 clicks in bump and 10 in rebound
110 mm travel
20 mm upright height regulation
20 mm bump stop (5000 N / 4 mm)



Upright height Adjuster
0mm (-10mm to +10mm)

FORCE ADJUSTAMENT

Red Adjuster (Rebound)
Blue Adjuster (Bump - Compression)
Pos 1-soft to 10-hard.



Rebound (Red ---> Rebound)
Compression (Blue ---> Bump)

Note:

- Clicks adjuster tool delivered with the car.

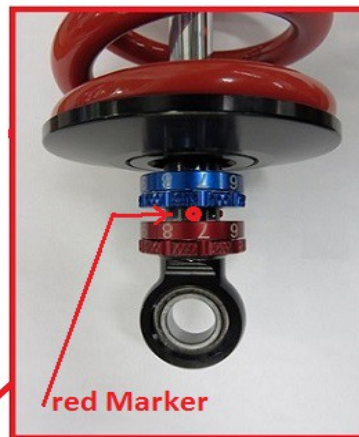
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Rear dampers
Aluminium outer housing Bilstein damper
2-way adjustable with 10 clicks in bump and 10 in rebound
119 mm travel
35 mm bump stop (5000 N / 4 mm)



FORCE ADJUSTMENT

Red Adjuster (Rebound)
Blue Adjuster (Bump - Compression)
Pos 1-soft to 10-hard.



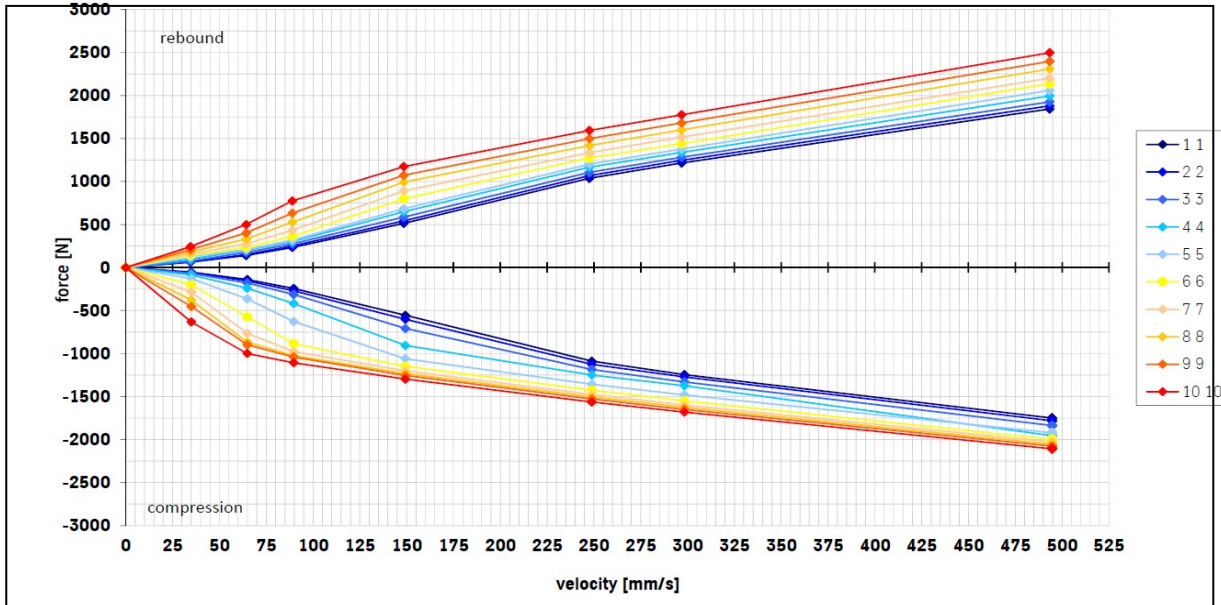
red Marker

Rebound (Red ---> Rebound)
Compression (Blue ---> Bump)

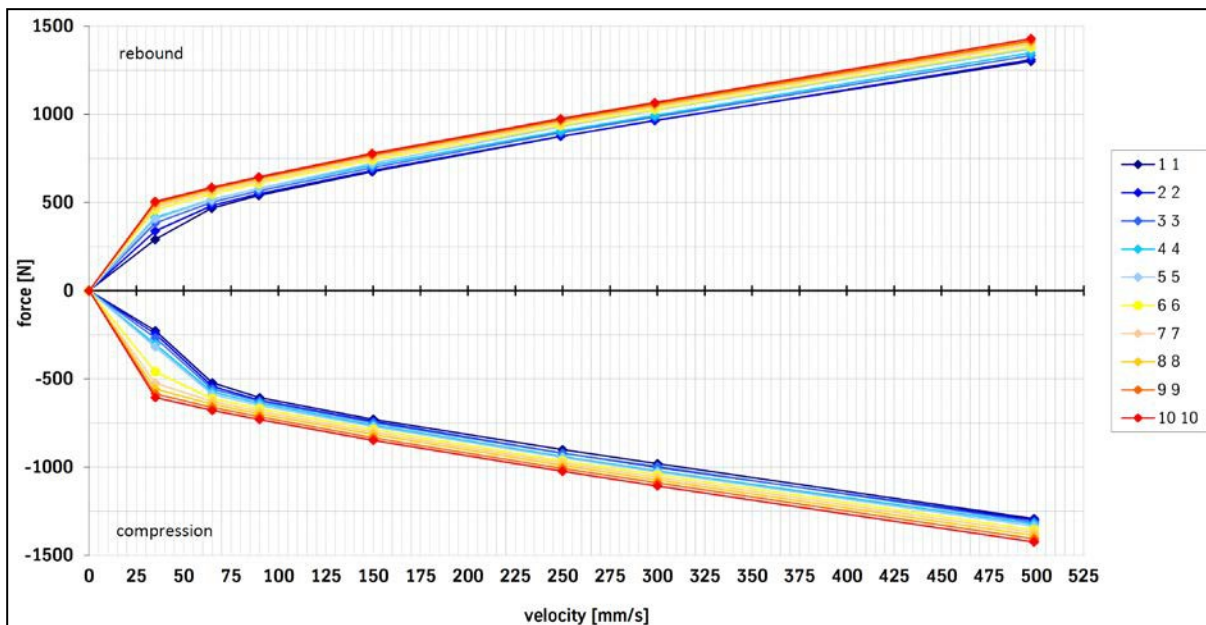


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Adjustment range of front dampers:



Adjustment range of rear dampers:





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4.9 Anti-roll bars

Three front anti-roll bars available: 22x2, 22x3 and 22x4. Car delivery: 22x3.

FRONT ARB			
OD (mm)	22	22	22
Thickness (mm)	2,0	3,0	4,0
Chassis Roll Stiffness from ARB			
Hard (Nm/°Chassis)	1548	2021	2637
Mid (Nm/°Chassis)	991	1293	1687
Soft (Nm/°Chassis)	688	898	1172

Three rear anti-roll bars available: 22x2, 22x3 and 22x4. Car delivery: 22x3.

REAR ARB			
OD (mm)	22	22	22
Thickness	2,0	3,0	4,0
Chassis Roll Stiffness from ARB			
Hard (Nm/°Chassis)	1078	1252	1454
Mid (Nm/°Chassis)	914	1061	1232
Soft (Nm/°Chassis)	773	898	1043



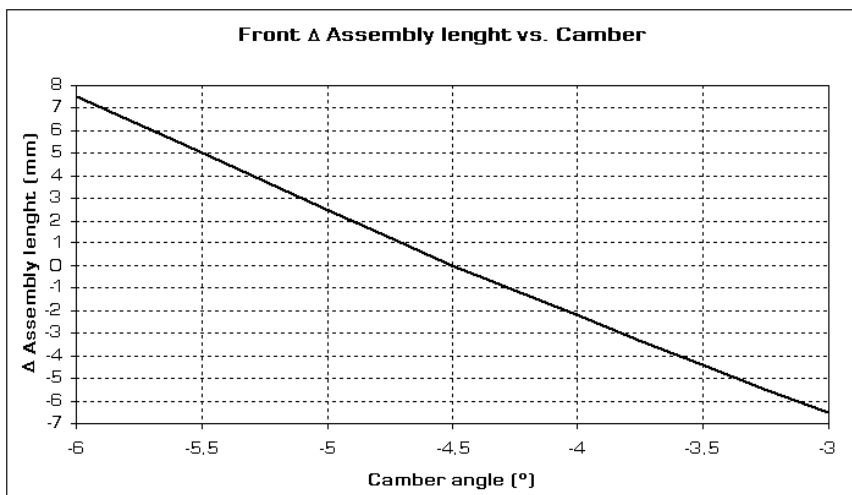
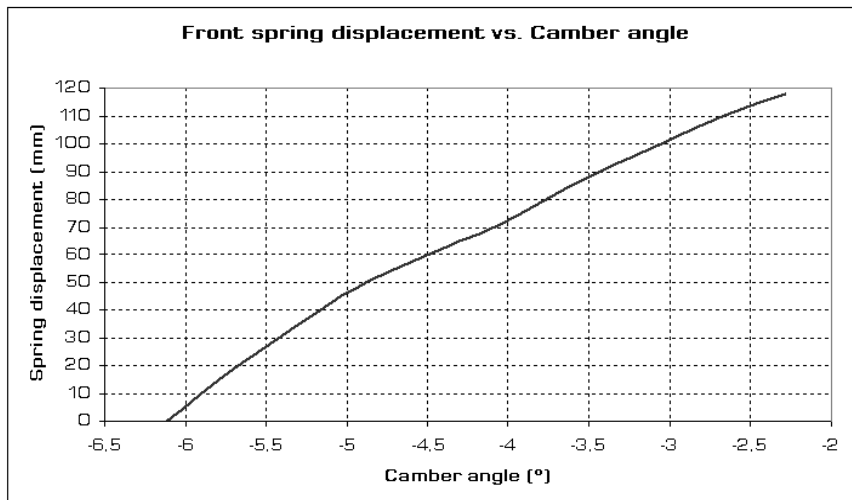
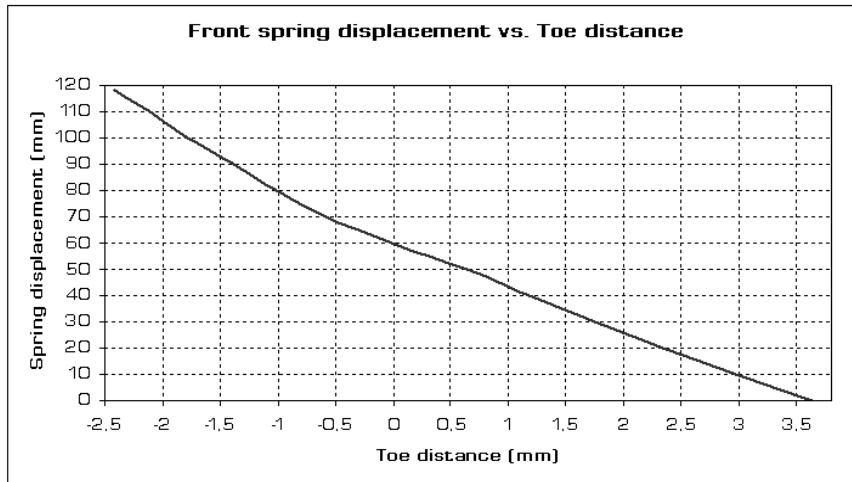


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4.10 Kinematics

	Front	Rear
Wheel ratio	1mm wheel / 0,9mm damper	1 / 1

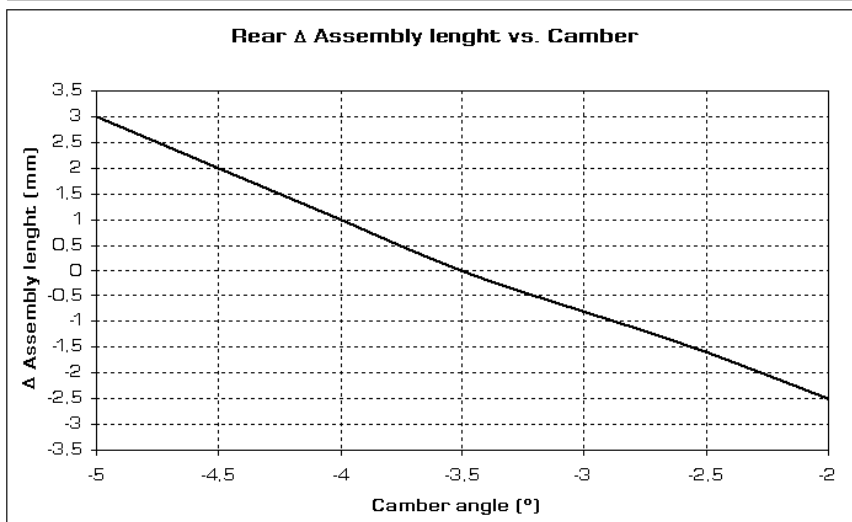
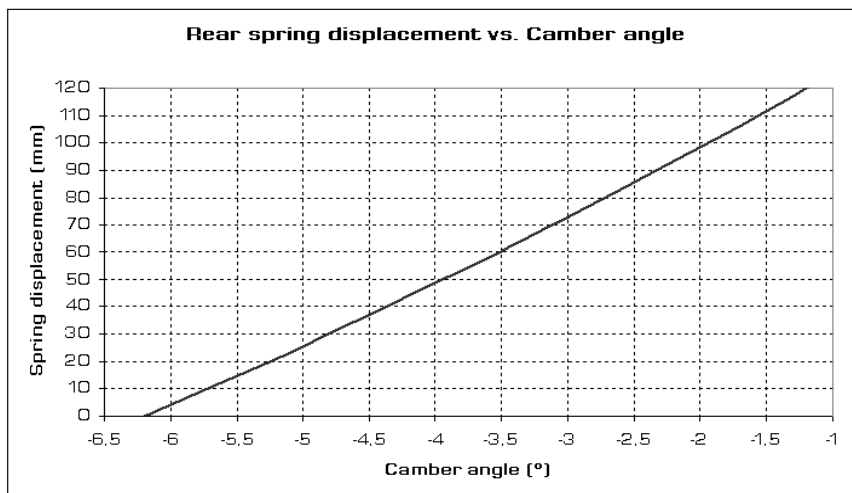
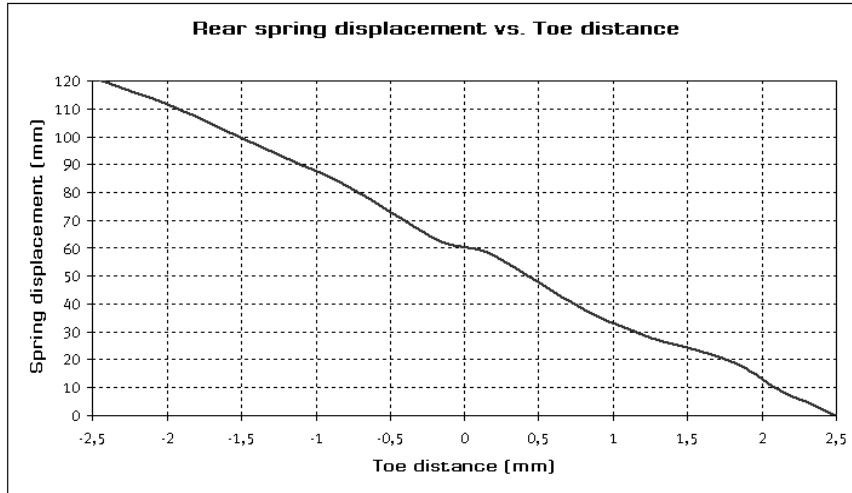
FRONT





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REAR





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4.11 Brakes

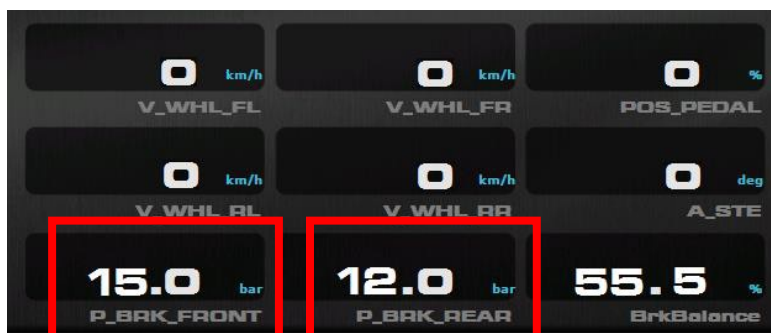
To set-up the brakes, the following pumps can be used in both axles:

Master cylinder	Push Rod	Remarks
AP 15 MM	PRT 110	
AP 15.9 MM	PRT 110	
AP 16.8 MM	PRT 110	
AP 17.8 MM	PRT 110	
AP 19,1 MM	PRT 110	Car delivery front
AP 20,6 MM	PRT 110	
AP 22,2 MM	PRT 110	Car delivery rear
AP 23,8 MM	PRT 110	

- It is not advisable to use more than two pump diameters difference between front and rear.
- If the master cylinders are replaced, take care on the correct installation and functioning of the brake balance bar. The following link shows how to assembly correctly:
<https://tiltonracing.com/wp-content/uploads/2013/07/98-1250-600-Series-Balance-Bars.pdf>
- On the dashboard screen it is shown the front/rear pressure and the balance percentage. The recommended percentage is 60% front (car delivery).
- Brake balance channel:

$$\frac{P_BRK_FRONT}{P_BRK_FRONT + P_BRK_REAR} * 100$$

To adjust the brake balance it is recommended to set first the rear brake proportioning valve on position 7, where it is fully open, and to ensure that the hand brake is not locked. After that, set the desired balance turning the yellow wheel on the main console. Remember not to press the brake pedal while turning the wheel.

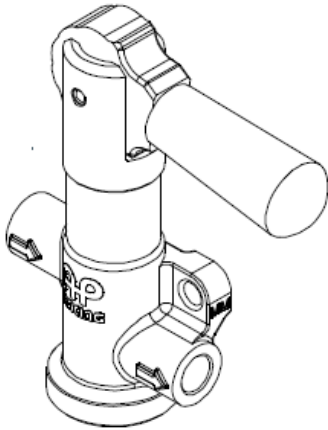


Set rear brake proportion valve on position on the desired position (standard position: 3)



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Rear brake pressure adjuster

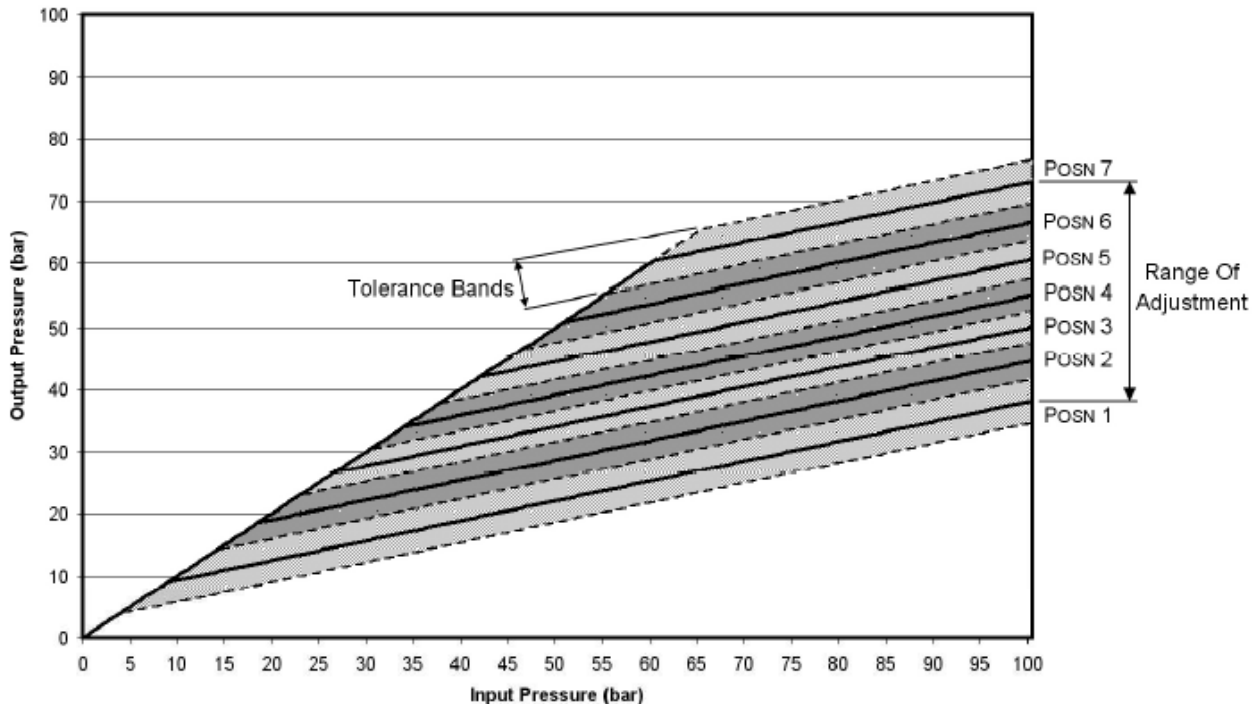


The lever type proportioning valve provides 7 distinct settings from which to produce the most suitable braking ratio.

The brake balance should be biased towards the rear so that with the valve piped in to the rear line and set in position 7 where virtually no reductions occurs, the balance is as much to the rear as will ever be needed. Moving the control lever to a lower setting will progressively reduce the rear line pressure giving more bias to the front, for use when more grip is available.

When the proportioning valve is fitted in the standard position on the car, position 7 is with the lever max backwards and position 1 with the lever max forward.

VALVES SETTINGS CHART WITH TOLERANCES

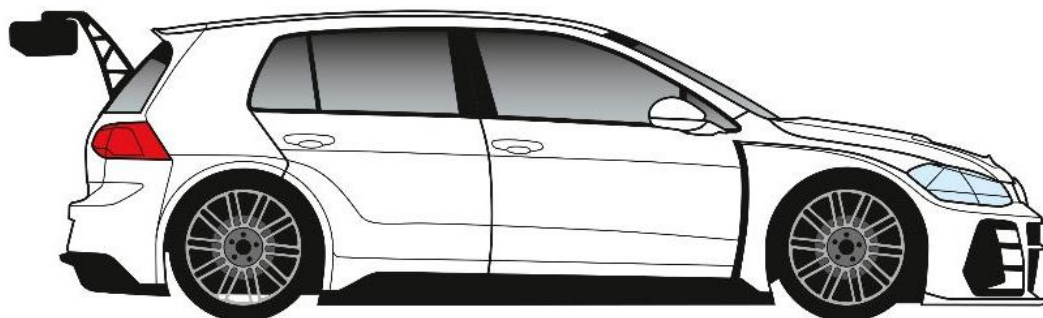




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4.12 Aerodynamics

It's strongly recommended checking periodically that all aerodynamic parts and their fixations are in good conditions.



Rear wing:

- The rear wing has extensive regulation. Zero is the standard setting for the car.
- Wing angle -5° has considerable influence on the rear down force.
- Wing angle -10° has big influence on the rear down force as well as in drag.
- Lateral plates are individually adjustable.

Aero Map	Ground Clearance Front	Ground Clearance Rear	Rear Wing Angle	Δ Drag	Δ Down Force	Δ Balance Forward
RH 80 mm	80 mm	80 mm	0°	1,5%	-2,5%	-5,0%
RH 70 mm / Reference	70 mm	70 mm	0°	0,0%	0,0%	0,0%
Pitch + 10 mm	70 mm	80 mm	0°	1,0%	5,0%	2,0%
Pitch -10 mm	80 mm	70 mm	0°	0,5%	-10,0%	-5,0%
Rear Wing 5°	80 mm	80 mm	5°	6,0%	8,0%	-20,0%
Rear Wing -5°	80 mm	80 mm	-5°	-3,0%	-18,5%	20,0%

Front splitter:

- Check periodically the fixations. It has to be in good conditions.
- Check the front splitter angle that has to be at 0° when pitch is 0° .

Pitch:

- Measure the pitch angle on the body shell over the door sill





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4.13 Driving position

On the following chapter is explained how to adjust the driving position.

Seat
FIA Homologated 8855-1999 OMP driver seat
2 sizes available upon request: Standard and XL size



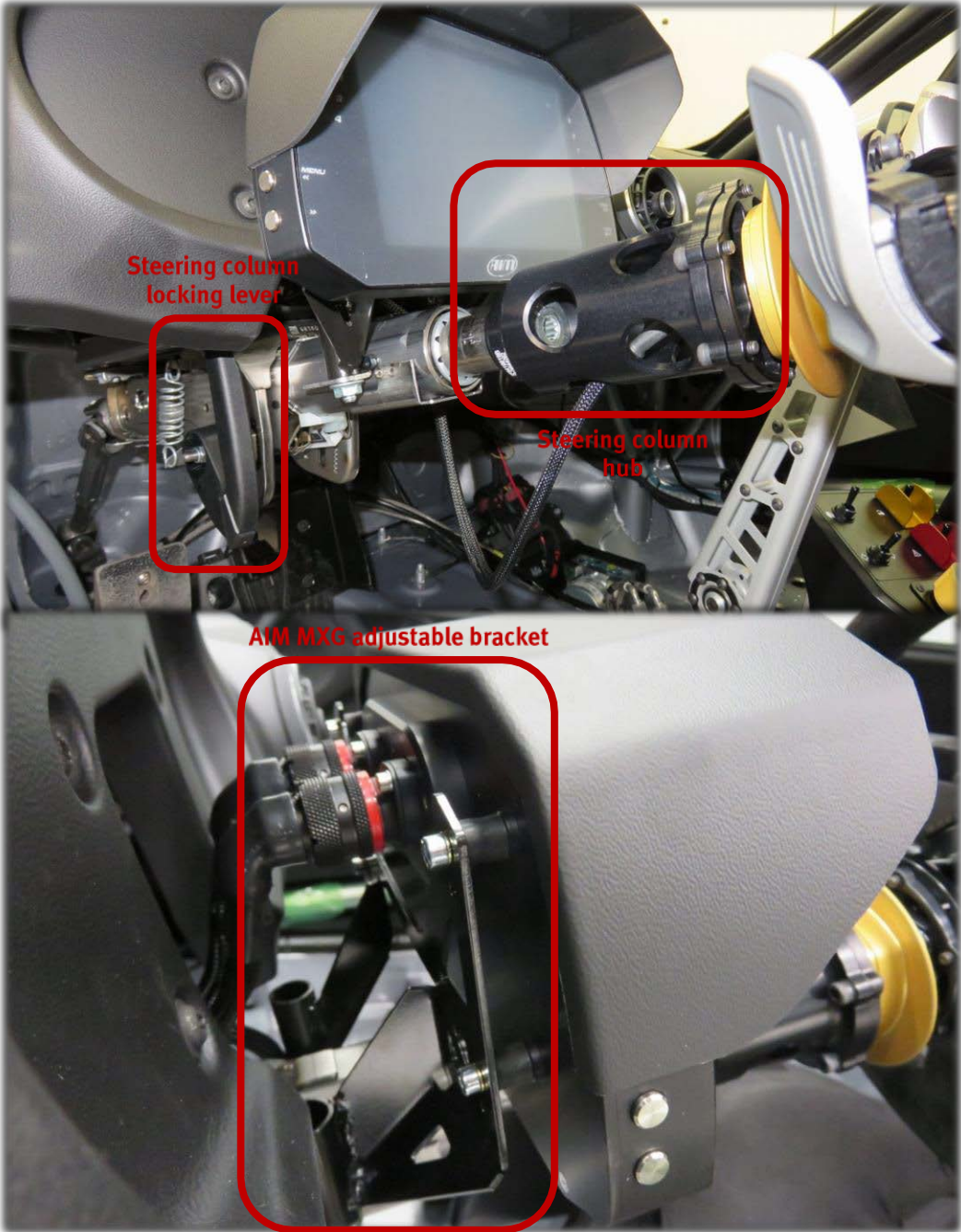
Belts and net
OMP window net meeting FIA Standards
6-point OMP safety belts to be used with HANS

Notes:

- Check the homologation label expiry date.
- Check always that the belts and the driver are well fixed

Steering column
Height and length adjustable
3 steering column hubs different in length available: 100, 120 and 140mm (car delivery)
AIM MXG display bracket adjustable in 2 positions: high and low (car delivery)

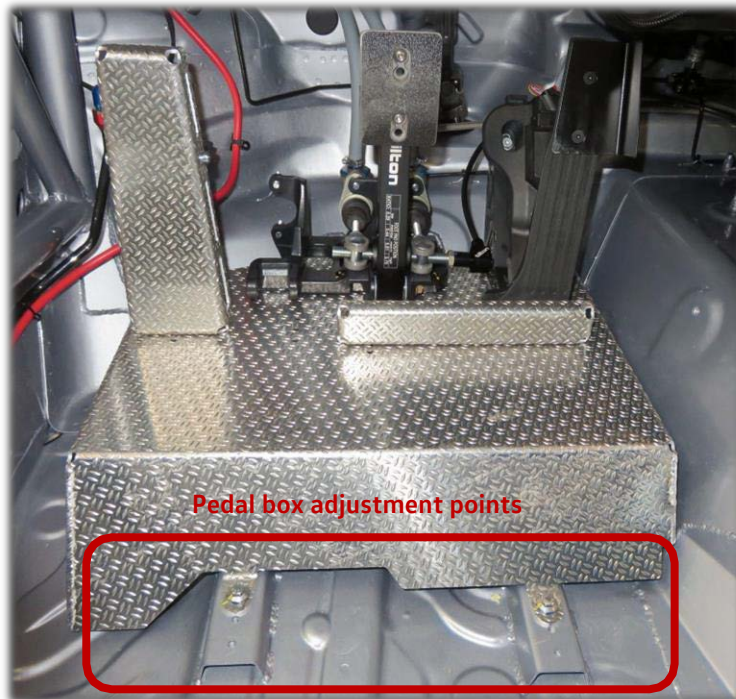






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Pedal box
Length adjustable in 5 position (car delivery in mid position)
Tilton racing pedal assembly with brake balance bar
90° foot stopper on throttle pedal right side





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5 WORKSHOP MAINTENANCE

5.1 First roll-out

Volkswagen Motorsport checks all cars in a roll-out before customer delivery. This roll-out consists in:

- 5 circuit laps.
- High speed in a long straight.
- Start rev limiter checking simulating a standing start.
- Speed limiter function checking.
- After the roll-out, VWOSP engineers check the data acquisition and all car functions.

Notes:

Although VWMS does a roll-out, it is strongly recommended to carry out a suspension check before first customer roll-out and after the first practice. Pay special attention to sub-frame, power train, engine brackets, fixations, etc.

5.2 Check-list

After any rebuild or main job it's recommended to carry out a check-list. It is possible to do it using the Live Measures view in RaceStudio3 and a laptop or directly using car's display.

	Check-list with engine stopped		OK
ENGINE	Oil level	On the dipstick mark / T_oil > 70°C	
	Coolant level	On the bottle mark	
BRAKES	Brake fluid	On the bottle mark	
	Steering wheel functions		OK
STEERING WHEEL	Rain lights		
	Cockpit fan		
	Display change		
	Safety brake signal		
	Windscreen water		
	Wiper		
	High beam		
AIM Live	Check-list with engine at idle speed		OK
ENGINE	Water temperature	87°C / 92°C (thermostat cycle)	
	Electrofan	Active at 92°C	
	P_ENG_OIL (WT<25°C)	4 bar	
	P_ENG_OIL (WT>25°C)	2,5 bar	
	P_FUEL	> 4,1 bar	
	Battery voltage	> 13,5 volts	
	Boost pressure	0,3 bar @ 2500 rpm	
	Speed limiter	Check all speed limitations	
GEARBOX	Tip		
	Gear display		
	Gearbox position		



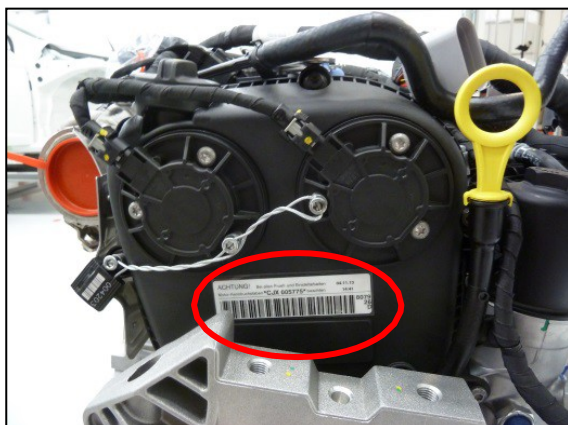
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DIFF	Diff pump		
	I_DIF_PUMP	>0,7A	
FUSEBOX	FLAG_FBX_1	0	
	FLAG_FBX_2	0	
	FLAG_FBX_3	0	
	FLAG_FBX_4	0	
	FLAG_FBX_5	0	

5.3 Body-shell and engine identification



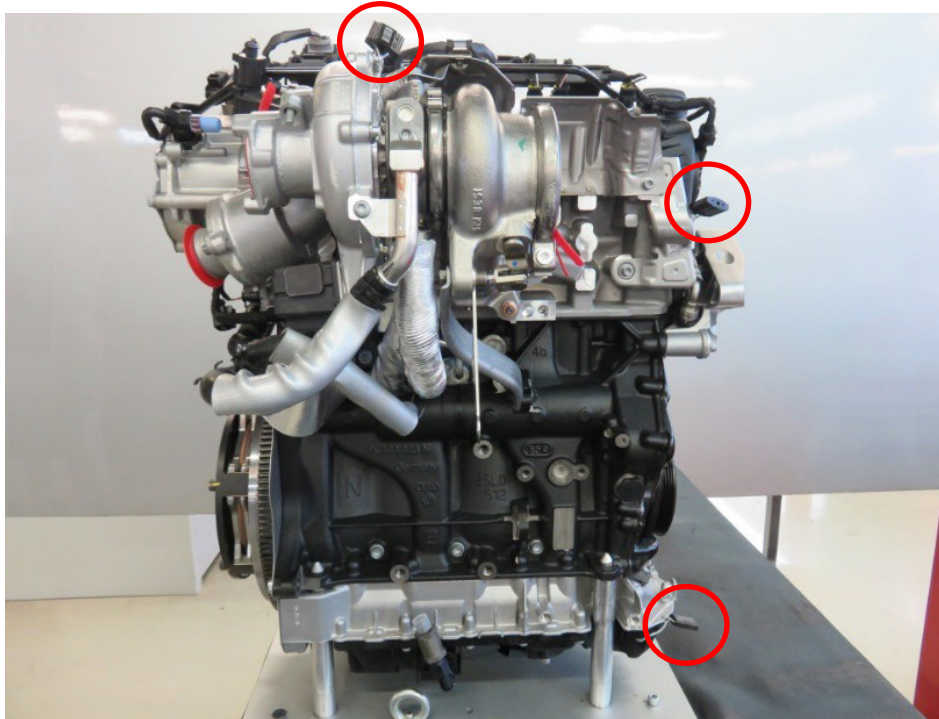
V.I.N. (Vehicle Identification Number) is welded on the roll cage



Engine number CJX XXXXXX



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Engine seals: boost, distribution and oil sump

5.4 Fluids

Fluids	References	Quantity
Engine	Castrol Edge 5W-30 LL 507 VN0000053000	5,7 l
Gearbox	VW AG G052182A2	5,2 l
VAQ	VW AG G060175A2	0,5 l
Drive shaft	Inner joint GKN grease MS9U025 VN0000040601	140 gr
	Outer joint GKN grease MS9U024 VN0000040401	140 gr
Coolant	VN0000060410	5 l
	VW AG G013A8JM1 - 10% add./90% dist. water	
Brake fluid	Castrol SRF	-
Fuel	102 Ron	-
Windscreen	Free	-

Notes:

- Standard fuel minimum 98 Ron from petrol stations may be used.
- Is recommended not to mixt fuels, they could contaminate one from the other.
- Gearbox is delivered with correct oil level. It is not necessary any level control if there is no leakage.



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5.5 Engine

Control routine before start to run:

- Check the oil level: with oil temperature up to 70°C, stop the engine and wait 2 minutes, then check the oil dipstick. The oil level must be at the top of the marked zone.
- Check the water level before start.
- With the engine running, check that there is not any oil, water or fuel leakage.
- Check the fan functionality. Operating range 92°C to 87°C.

Maintenance routine:

- Change the engine oil and oil filter at the indicated mileage.
- Engine spare parts must be from VW group original parts, detailed on the VW Golf GTI TCR parts catalogue.
- Use always the fluids detailed above, User Manual point 5.4.
- Clean and check the air filter at least once per event. At urban circuits, clean or replace it more frequently. It is recommended to have two or three air filters and replacing it during the weekend. Changing it is strongly recommended in case of rain.
- Check that the alternator belt is clean and that there are not small stones inside the Poly-V.
- Clean the radiator and intercooler panel often.
- If any doubt, contact VWMOSP service.
- Check that the seals are in good conditions, if a replacement is needed contact VWMOSP

Parts subject to frequent service:

Engine	Torque	Remarks
Oil drain plug	By hand	
Oil filter plastic cover	25 Nm	
Oil filter		Moisten the "O" ring
Spark plug	28 Nm	Use only original VW parts

For detailed parts substitution information download the Workshop Manual from our web.

5.6 Air filter

Standard air filter cleaning procedure:

1. Remove the air filter from the car and plug opening to throttle body with a clean rag to stop any crud getting where it shouldn't.
2. Disassemble filter assembly by removing the four small screws at the bottom (intake side) of the outer-body and pull out the filter element.
3. Tap the filter gently to dislodge the larger debris that have collected, do not use compressed air as you could damage the paper elements.
4. Apply detergent to the filter. Squirt the fluid down the elements from the outside while holding the filter at an angle over a bucket. Don't re-distribute the detergent that's collected in the bucket through the filter again.





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Once you covered the whole filter leave the filter to stand for ten minutes to allow the detergent to break down the old oil in the filter.

5. Using another bucket rinse filter with cold water until no more debris collects appear at the bottom of the bucket.
6. Pat your filter dry and place somewhere with good air flow and allow the filter to dry naturally. Do not use compressed air or place in a very warm area as this could damage the filter element.
7. Once you have applied two coats of oil along both sides of the filter pleats, hold the filter and ensure the filter is an even red colour.



8. Once it is evenly coated, leave it stand for 30 minutes. Carefully pat the excess off the filter with paper towels.
9. Rebuild your filter taking care that the screw holes match up and fit it back in the car.

Air filter	Torque	Remarks
Substitution	By hand	Be careful tightening the small bolts over plastic
Cleaning		Clean the cotton air filter following the procedure shown above. Do not use compressed air or high-pressure air to clean. Use only recommended oil for cotton filters.

Notes:

- **The air filter type and measurements are identified on the Technical Form.** It is not allowed to do any modification or change.
- A clean and properly oiled air filter is basic to ensure boost's life. It is strongly recommended to follow the cleaning procedure as well as the replacement frequency.
- After rain conditions use, it is strongly recommended the cleaning or replacement.



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5.7 DSG Gearbox

Control routine before start:

- Check that there is no oil leakage.
- Operating range 70°C to 135°C. Do not load the engine until the temperature is above 70°C.

Routine maintenance:

- Change the gearbox oil and the filter in the indicated mileage.
- The oil and the oil filter must be the recommended ones.
- All gearbox spares must be VWMS original parts, detailed on the VWMS TCR Spare Parts Catalogue
- If there is no oil leakage it is not necessary any level control
- Contact VWMS and sent it for service when the service mileage is reached

How to change the gearbox oil:

- With the gearbox oil temperature below 50°, the lever in position P, the vehicle on a level and the engine stopped, remove the oil drain plug and the overflow pipe located inside.
- Wait until all the oil runs out, more or less 5 litres, and screw the overflow pipe again (3Nm). Change now the gearbox oil filter.
- Fill 5,5 litres of new oil and hand-tight the oil drain plug. VWMS recommends using the adapter for gearbox filling (VAS 6262A). If not fill it from the oil filter housing (slower).
- Start the engine. Release brake pedal and select each selector lever position for 3. Seconds. Then go back to P. Do not switch off the engine.
- With the engine running at idle speed and the gearbox oil between 35 and 45°C, remove the oil drain plug again and let the surplus oil drain out. When it begins only to drip, install the oil drain plug with a new seal (45Nm).



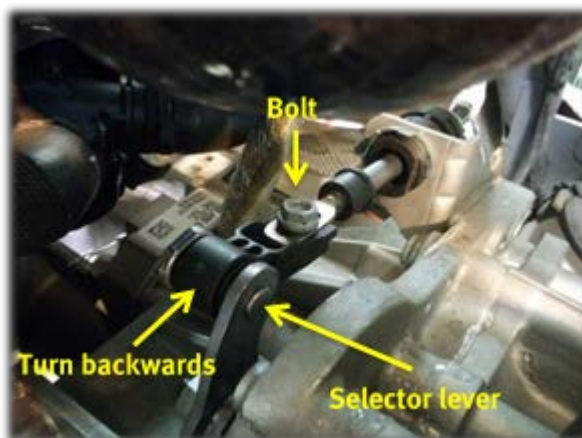
Note:

- If when doing the level after removing the oil drain plug no oil drains out: stop the engine, add 0,5 liters more and repeat the process from running the gearbox in all selector lever positions on.

How to adjust the selector lever:

- Unscrew the selector lever bolt (see picture)
- Put the lever in P position
- Turn the gearbox selector lever backwards.
- Screw the selector lever bolt.

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5.8 VAQ differential

The VAQ is a self-locking electro-hydraulic differential, with three different mappings that change the behavior either for power or braking

Routine maintenance:

- Change the VAQ oil at the indicated mileage.
- The oil must be the recommended one
- All VAQ spares must be VWMS original parts, detailed on the VWMS TCR Spare Parts Catalogue
- If there is no oil leakage it is not necessary any level control
- Contact VWMS and sent it for service when the service mileage is reached

VAQ	Torque	Remarks
Oil level check cap	15Nm	Change every time

How to change the VAQ oil:

- To replace the oil is recommended to disassemble the unit from the car
- Open the level check cap, drain it and close it again
- Measure the quantity and put in the same quantity



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- If it is done mounted on the car the last 100ml are not possible to add from the cap (see the picture below). These last 100ml must be added through the venting pipe on the engine bay.



Notes:

- In case of disassembling the unit from the car, the unit must be positioned in vertical position, as it is shown in the picture above, to avoid oil leakages

5.9 Fuel tank

The 100l FIA FT3 fuel tank is working with one unique fuel pump and a Venturi hoses system. The pump is controlled through a PWM fuel control module.

FUEL TANK Mts	
Fuel tank type	FT3 FIA Approved
Capacity	100 l \pm 2%
Minimum fuel level before engine fault	> 0.5 l. (in any conditions)
Cell valve	Ventilation / pressure keeping / roll over /
Refuelling	Safety FIA plug

Refueling tool:

The fuel tank is served with a FIA approved fast coupling plug. The socket is the necessary connector-tool that has to be used for refueling the tank. This part is available on the Spare Parts Catalogue.



Refueling process:

1. Prepare an external bottle with the measured quantity to refill. It is recommended using a ground cable on the bottle to avoid static electrical discharges.
2. Open the fuel tank cover, connect the refill hose with the coupling socket to the fuel tank plug (n° 1 on the picture) and the fuel will flow inside.

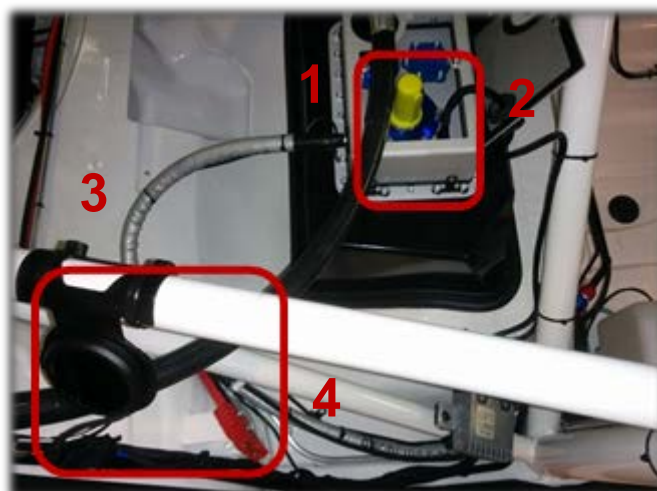
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3. Set the fuel level display with the fuel amount inside the tank. This value will be shown also on the AIM MXG display. For more info about the fuel level display check point 3.5 above on this User Manual.
4. Be careful and precise with the quantity refilled, the driver will not feel any power engine drop until the car stops.

Picture information:

*Fuel tank placed on the car view

- 1 Fuel tank refill plug
- 2 Fuel pump connector
- 3 Fuel level display
- 4 Battery supply



Fuel tank Drain:

Hydraulic: There is a FIA fast coupling plug placed on the engine bay fuel line ready for this use. The contra connector D-6 socket it is available on the Spare Parts Catalogue.

Electric: VWMOSE has developed a new electronic tool to activate the fuel tank pump permanent or automatic function. The automatic performance function avoids damages to the fuel pump when pump is activated without fuel. (fuel tank empty)

How to proceed for drain

1. Connect the electric tool on the fuel pump connector (n° 2 on the picture), placed on the fuel tank, and the power supply on the auxiliary battery connector (n° 3 on the picture).
2. Connected the fuel socked connector on the engine bay, (narrow on the picture below)
3. Switch on the electric tool in automatic or manual function. If the automatic mode is selected the tool will stop the draining process when there is no more fuel inside the tank.

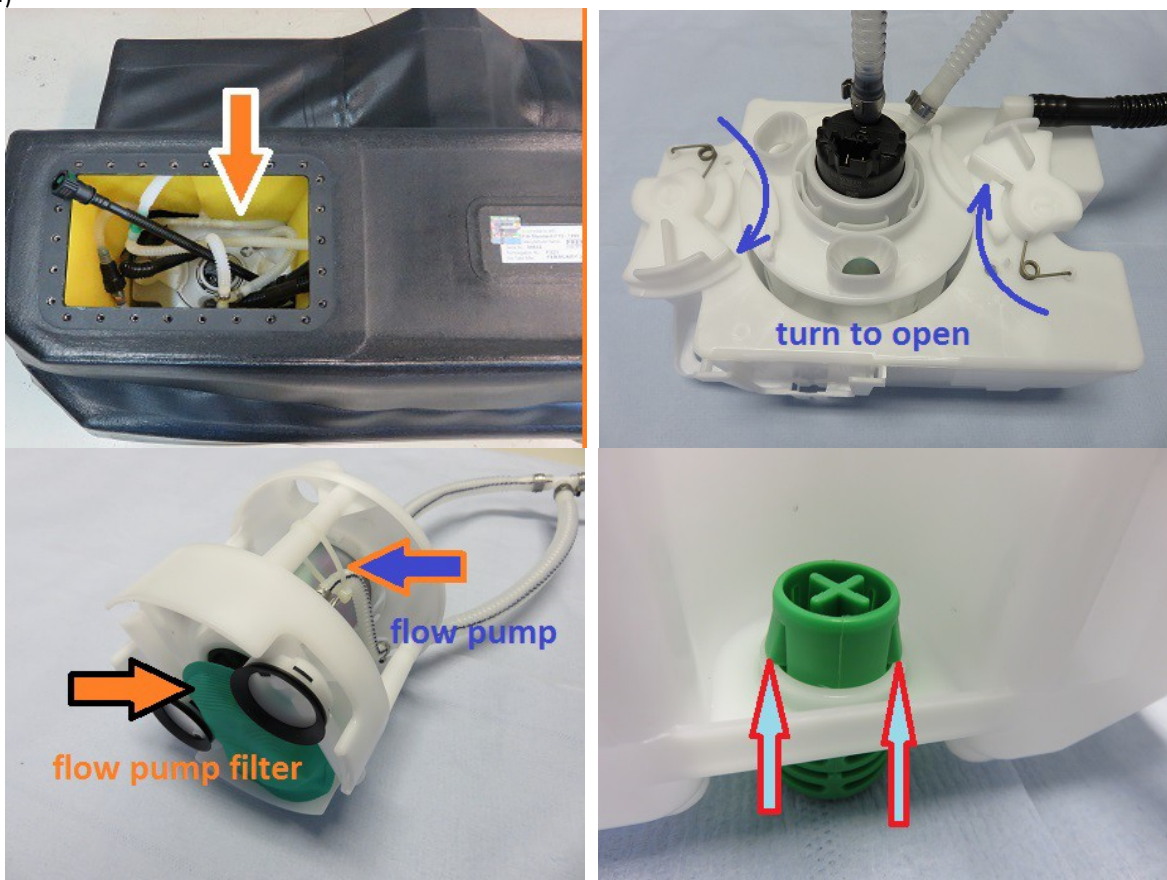


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How to clean the flow fuel pump filter:

1. Drain the fuel tank completely.
2. Open the fuel tank. (right side) (Fig 1)
3. Raise a little bit the plate and disconnect the pipes and wirings.
4. Turn the fastening and pull up the pump from the reservoir. (Fig 2)
5. Remove the green mesh filter and clean it. (Fig 3)

In case you need to take out the reservoir, close the green plastic brackets legs and pull up the reservoir (Fig: 4)

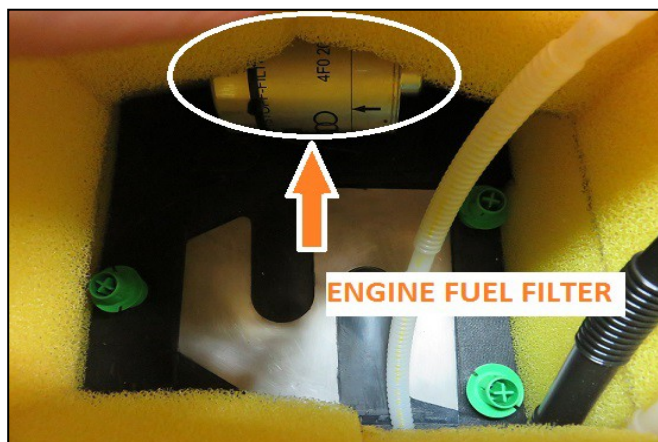


How to replace the engine fuel filter:

1. Drain out the fuel tank completely.
2. Open the right cover of the fuel tank.
3. Remove the fuel pump and the reservoir as explained above.
4. Cut the tie-wrap, disconnect the fuel pipes and take out the fuel filter.
5. Fix the new filter on the bracket, reconnect the fuel pipes, assemble the reservoir and close the fuel tank again.

The engine fuel filter is placed inside the fuel cell. The part is fixed by plastic clamps and fuel pipes are connected by fast couplings.

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5.10 Airjack

The VW Golf GTI TCR car is provided with an Airjack system. The connector is placed on the rear lateral right side (inside std refueling cover). The parts are available on the Spare Parts Catalogue.

AIR JACK SYSTEM	
MAX AIR LIFT PRESSURE	30 bars
Airlance inlet threat (LL-03)	M16 x 1.5

Notes:

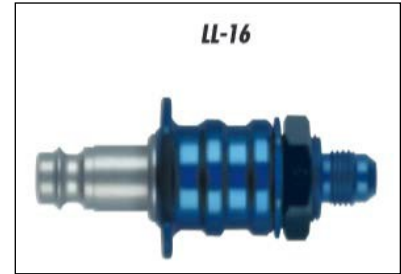
- **IMPORTANT: Never work under a vehicle supported only by Air Jacks unless safety props are fitted.**
- Do not use 'U' bolt type clamps as distortion of the body will cause the Air Jack to stick. Do not loosen or remove adaptor. Jacks must be vertical during operation. Mounting brackets or clamps to be fitted to threaded section of body only.
- Do not use petrol or paraffin for cleaning the Air Jacks as this will damage the rubber seals. Use an alcohol based cleaning fluid e.g. Methylated Spirit. Use only silicone spray or silicone grease when internal lubrication is necessary.





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Airlance and car plug dismantled view:





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6 Parts mileage

To check the car mileage, use the odometer available on the AIMMXG display. A reset can be done through the display or using RaceStudio 3 on a laptop

Engine	Inspection (km)	Race service (km)	Race change (km)	Remark
Engine	-	-	10.000	-
Spark plug	-	-	1.000	Use original VAG parts only Endurance Race: change after the race
Engine oil	-	-	1.000	Use recommended oil only Endurance Race: change after the race
Oil filter	-	-	1.000	Use original VAG parts only Endurance Race: change after the race
Cotton air filter	Once per event	Once per event		2 units rolling change adv.
Poly-V belt	Once per event	-	1.000	Endurance Race: service after the race

Transmission	Inspection (km)	Race service (km)	Race change (km)	Remark
DSG gearbox	-	4000	8.000	VWMS Racing Service – revisions over this mileage can be done under customer responsibility
Gearbox oil	-	-	4.000	Use original parts only
Gearbox oil filter	-	-	4.000	Use recommended oil only
VAQ differential	-	4000	8.000	VWMS Racing Service – revisions over this mileage can be done under customer responsibility
Diff pump			4.000	Replace at this mileage
Diff oil		-	1.000	Use recommended oil only
Driveshaft	Once per event	4.000	10.000	





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Fuel tank	Inspection (km)	Race service (km)	Race change (km)	Remark
Flow pump filter	1000	-	8.000	First inspection at 150km
Flow fuel pump	-	-	-	Control low fuel pressure data
Engine fuel filter	-	-	10.000	Use original parts only

Front axle	Inspection (km)	Race service (km)	Race change (km)	Remark
Front dampers	Once per event	4000 / 1 year	10.000	Bilstein service
Ball joints	Once per event	-	Once per year	Always check tolerance
Steering rod inner joint	Once per event	-	Once per year	Always check tolerance
Steering rack	-	-	15.000	-
Wheel hub	Once per event	-	10.000	Change when noisy
Brake balance bar	Once per event	Once per year	-	-

Rear axle	Inspection (km)	Race service (km)	Race change (km)	Remark
Rear dampers	Once per event	4000 / 1 year	10.000	Bilstein service
Ball joints	Once per event	-	Once per year	Always check tolerance
Wheel hub	Once per event	-	5.000	Change when noisy or excessive free play
Wheel nuts	-	-	Once per year	-

Safety parts	Service	Change	Remark
Extinguisher	2 years	-	OMP Service
Seat	-	5 years	-
Safety belts	-	5 years	-
Fuel bladder	5 years	7 years	Check leakages
Battery	-	3 years	-



