Land Rover Defender 90,110,130 full air suspension kit

Contents

Thank you for purchasing a system by On Air Suspension!

SAFTEY INFORMATION

Please abide all health and safety regulations that come with installation off this kit

Remember this kit is not designed to increase gross vehicle weight (GVW) . For your own safety please do not exceed to maximum GVW set by the manufacturer.

WARNING ⚠
During installation, use protective equipment especially for feet, hands, eyes and ears. Abide to all health and safety regulations and accident prevention regulations.
When lifting the vehicle make sure the correct jacking points are used, if needed consult the vehicle manual. Do not perform any work on an improperly jacked vehicle as to avoid serious injury or even death.
Once the air suspension system is operational, high air pressure can be present. Prior to disassembly disconnect power and relieve pressure. Consult owner's manual on how to disconnect the battery.
CAUTION ⚠
If work is carried out in an unauthorised way, damage may occur to the air suspension kit and/ or the vehicle,. Any manner other than specified in the instructions is classified as an unauthorised action.

Pre-assembly information

When routing the tubing and harness, avoid sharp bends / kinks as these can lead to air line blockages or tube breakages in the long term.

When cutting tube, make sure to cut at a right angle with either a sharp blade or tube cutters, do not use pliers or scissors as this could possibly deform the tube and cause premature air leaks in the system. Do not attach the harness or air lines to any brake lines.

Attach all electrical wires where stated within the fitting instructions. It is prohibited to attach these wires in any other location and any issues with the air suspension kit will not fall under the warranty if the fitting instructions are not followed.

Any OEM parts that have been removed in order to fit the air suspension, must be replaced back in their original position and condition (where applicable).

For any OE parts being re-fitted, please refer to the vehicle manufacturers manual for torque settings. This includes parts such as shock absorbers.

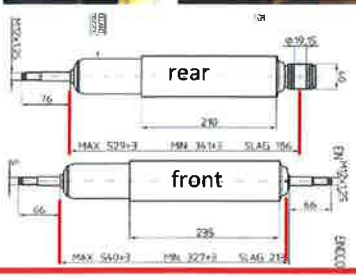
Please refer to all the health and safety standards. These precautions are put forward to prevent major bodily harm or even death !

Compatibility list

It is important you abide by this compatibility list so to protect components in the air suspension kit. Any parts warranty would be void if not following this criteria.

Bump stops. Minimum height from chassis 70mm*.

*Bump stop spacers are provided to meet this criteria when using standard LR factory bump stops.



Anti-roll bars. Passive front & rear ARB's must be fitted.

Shock absorbers. Front shock max. length 545mm,

Rear shock max. length 535mm.

Kit Contents

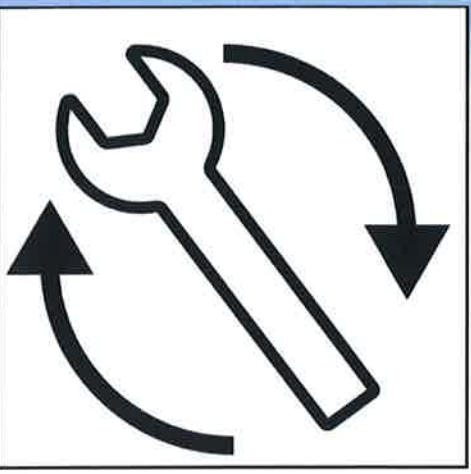
Name	quantity	Fitted location
Front air spring assembly	2	Front coil spring replacement
Defender front top bracket assembly	2	Air spring assembly
Height sensor lower linkage	4	Height sensor lower linkage to radius arms
Defender compressor bracket	1	Outboard chassis left in front off battery box
Defender rear 130 top bracket assembly	2	Rear air spring assembly
Defender 130 top retaining strip	2	Rear air spring assembly
Rear air spring assembly	2	Rear coil replacement
Front turret set, lower brackets & tube	1	Front shock absorber mounts
Koni or Fox front shock absorbers (optional)	2	Front turret shock mounts
Koni or Fox rear shock absorbers (optional)	2	Rear shock mounts
Electronic controls 4C (inc. manual inflation valves & air line)	1	Refer to instructions for location
Air fitting 1/8 to 6mm elbow	4	Air springs
EJOT self tap hex screw 9.9OD 6.0ID x 40	8	piston to axle attach
M8x1.25 nyloc nut	8	Front air spring top bracket to chassis
M8x1.25 cap head screw x 30 long	8	Front air spring top bracket to chassis
M8 plain washer	16	Front air spring top bracket to chassis
Lower height sensor linkage	4	Height sensor to radius arm
Lower height sensor weld tabs	4	Height sensor to radius arm (optional)

Kit Contents

Name	Quantity	Fitted location
Plain washer M10	4	Air spring / piston
M12x1.75 height 10 nyloc nut	2	Rear top bracket to chassis attach
M12 plain washer	2	Rear top bracket to chassis attach
M16 hardened washer	5	Panhard & radius arms replacement washer
M16 x 1.5 nyloc nut	4	Panhard & radius arms replacement nut
M16 1.5 x 100 hex bolt grade 10.9	1	Panhard spare side to lower shock bracket
M6 shakeproof (star) washer	4	rear height sensor bracket to chassis
M6 plain washer	4	front height sensor bracket to chassis
M6x1.0 rivet nut steel	4	rear height sensor bracket to chassis
M6x1.0 nyloc nut	4	front height sensor bracket to chassis
M6x1.0 x 16 long set screw	8	height sensor bracket to chassis
M8x1.25 x 16 long set screw	8	Air spring top—front & rear
M8 plain washer	8	Compressor bracket
M8x1.25 nyloc nut	8	Compressor bracket
M8x1.25 x 25 long set screw	8	Compressor bracket and tank attachment
M10x1.5 nyloc nut	8	Front air spring top bracket to chassis
M8 shake proof (star) lock washer BZP	16	Air tank attach + rear height sensor + air spring top
4 corner emergency inflation panel (optional fitment)	1	Left hand side battery box shield
OE bump stop spacer kit	1	Above front & rear bump stops

General Torques settings

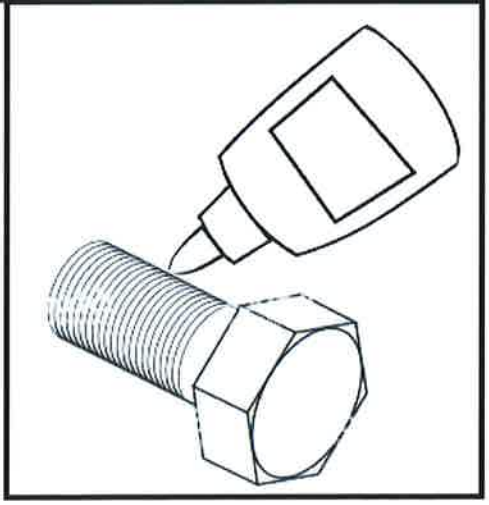
Bolt type	Grade 8.8	Grade 10.9
M3 X 0.50	1Nm	1.5Nm
M4 X 0.70	4Nm	6Nm
M5 X 0.80	6Nm	8.5Nm
M6 X1.00	8.5Nm	12.5Nm
M7 X 1.00	14Nm	20.5Nm
M8 X 1.00	22NM	30NM
M8 X 1.25	20.5NM	30Nm
M10 X 1.00	45Nm	70Nm
M10 X 1.25	45Nm	65Nm
M10 X 1.50	40Nm	60Nm
M12 X 1.25	80Nm	110Nm
M12 X1.50	75Nm	110Nm
M12 X 1.75	70Nm	105Nm
M14 X 1.50	120Nm	175Nm
M14 X 2.00	115Nm	165Nm
M16 X 1.50	180Nm	270Nm
M16 X 2.00	170Nm	250Nm
M18 X 1.50	270Nm	390Nm
M18 X 2.00	245Nm	350Nm



Torque values provided are to be used unless otherwise stated in instructions or by component / vehicle manufacture

Thread lock application

Apply thread lock where symbol is seen



Step by step installation

1) Raise the vehicle until the tyres clear the ground, then remove wheels. Provide support to axles then remove the bottom shock absorber bolts.
2) With the shocks released, you can now lower the axle to give access to the suspension. Remove the coil springs. Make sure this operation is carried out according to the vehicle manufacturers instructions.

Starting with the rear suspension—bump stop spacers

3) If your vehicle uses factory bump stops, you need to fit the supplied bump stop spacers before installing air springs to ensure a minimum height from chassis of 70mm is provided.

A) Remove the rear bump stops to expose the bump stop carrier as welded to the chassis.
B) Ensure the bump stop area is clean & free of debris. Fit the rear bump stop spacer. Depending on version supplied you may have a pre-curved spacer where curve is to fit upwards to be close to the chassis curve.

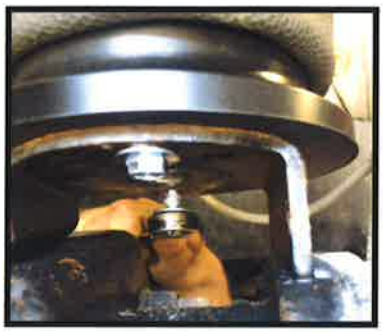
C) Use thick M8 bushes, cap head screws, washers & nuts to secure the bump stop back into place. Ensure bump stop is sitting flat on spacer.

Rear suspension air springs

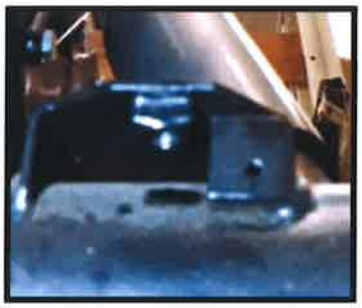
4) The bottom mount of the coil spring has a spring retainer and circular disc attached to the axle seat. These components are to be removed to leave the lower mounting seat exposed and ready to be used ensuring it is clean & flat.

5) Attach the top bracket to the top of the air spring using the bolts & shake-proof washers supplied in the kit.

6) Pull up the air spring rubber to expose the piston. This will allow for free rotation and easy alignment of the holes as shown on the right*. *The centre bolt of piston is loose but loctited in place to allow free rotation—DO NOT TIGHTEN!



In cases where the rear defender axle is a Salisbury axle it comes with two nuts that have been tap welded on to the lower mounting seat, these need popping out for the bolt to fit through the hole.



7) Attach the axle bracket to the bottom of the air spring by feeding the screws through the lower mounting seat, through the bracket and directly into the piston on the air spring. Tighten incrementally left/right to ensure piston remains flat with bracket.

8) Push air line into the air spring & temporarily fit an inflation valve. Inflate the air spring carefully at low pressure to bring the top bracket to the vehicle turret. Ensure you have the correct orientation, happy the air line is not being kinked & the rubber bellows is not twisted or buckled. The bracket is to now sit neatly into the vehicle turret. Secure bracket with retaining strip using nylon nut & washer.

It is imperative that there are no kinks in any of the air lines.

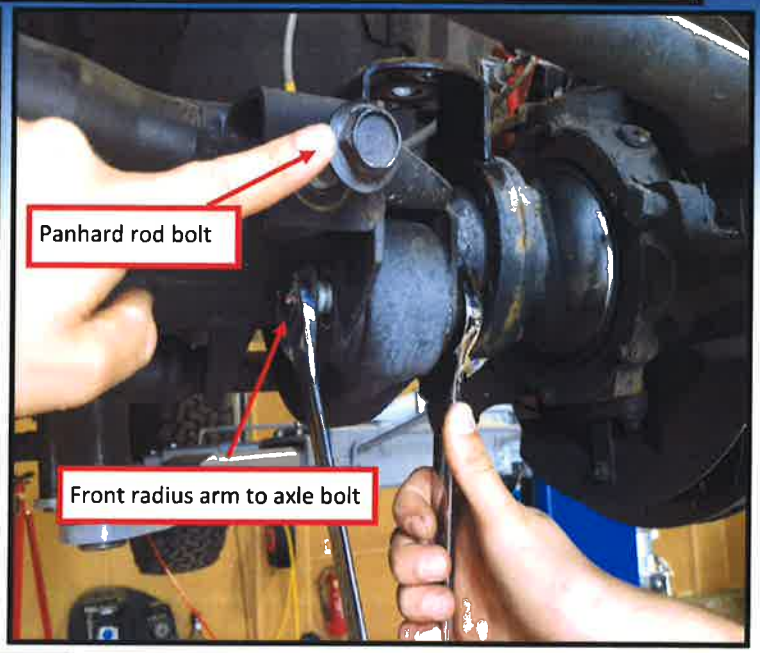
Front suspension - Fitting the shock absorber lower mounts

9) Bottom mount. Remove the nut from the front radius arm to axle bolt. Remove the bolt from the Panhard Rod to the axle bracket.

10) Fit the lower shock absorber mount over the radius arm bolt, re-fit the Panhard rod bolt and tighten the nuts.

11) Repeat for the other side of the vehicle using a nut and bolt where the lower bracket mounts to the spare Panhard Rod bracket along with the supplied tube—see below.

12) You may need to rotate the Panhard to axle bolt to avoid a clash with the lower bracket during axle articulation.



Attached shock absorber lower mounts

Panhard to axle bolt correct orientation

Front bump stop spacers

13) If your vehicle uses factory bump stops, you need to fit the supplied bump stop spacers before installing air springs to ensure a minimum height from chassis of 70mm is provided.

A) Remove the front bump stops to expose the bump stop carrier / dish as welded to the chassis.

B) Ensure the bump stop area is clean & free of debris. Hold the front bump stop spacer into the dish while positioning the bump stop.

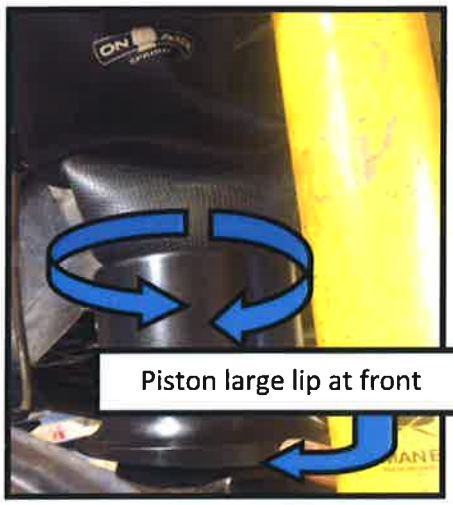
C) Use thick M8 bushes, cap head screws, washers & nuts to secure the bump stop back into place. Ensure bump stop is sitting flat on spacer.

Front suspension - fitting turrets & air springs

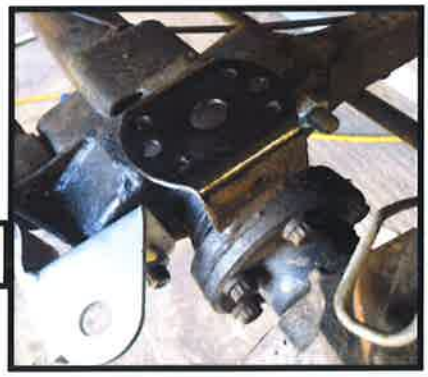
14) Top mount. Remove shock absorber top nut & then remove the four shock absorber turret nuts before removing through the inner arch hatch.
15) Place the new turret with forward facing shock attachment. Make sure to use the correct orientation — the top of turret should be sitting close to the inner arch.

Inner arch hatch for turret removal

Air spring top bracket



Piston large lip at front



16) Attach the air spring top bracket to the turret and chassis using the M8 cap head bolts supplied in the kit. A) You may choose to loosely insert the air spring fixings & star washers for tightening later. B) Alternatively, you could attach air springs to brackets 1st & then attach turrets using the supplied long round Allen key at the rear.
17) Pull down the air spring piston to expose the rubber bellows. This will allow for free rotation and easy alignment of the holes*. *The centre bolt of piston is loose but loctited in place to allow free rotation—DO NOT TIGHTEN!

18) Remove lower plates from axle & once again ensure the mounting seat is clean & flat. Tighten incrementally left/right to ensure piston remains flat. The piston lip is bigger on the front of the vehicle per photo.
19) Push air line into the air spring & temporarily fit an inflation valve. If not yet attached, inflate the air spring carefully at low pressure to bring the top of air spring to the vehicle turret assembly. Ensure you have the correct orientation, happy the air line is not being kinked & the rubber bellows is not twisted or buckled.

20) Now continue to install the shock absorbers. Bolt the shock absorbers to each mount.

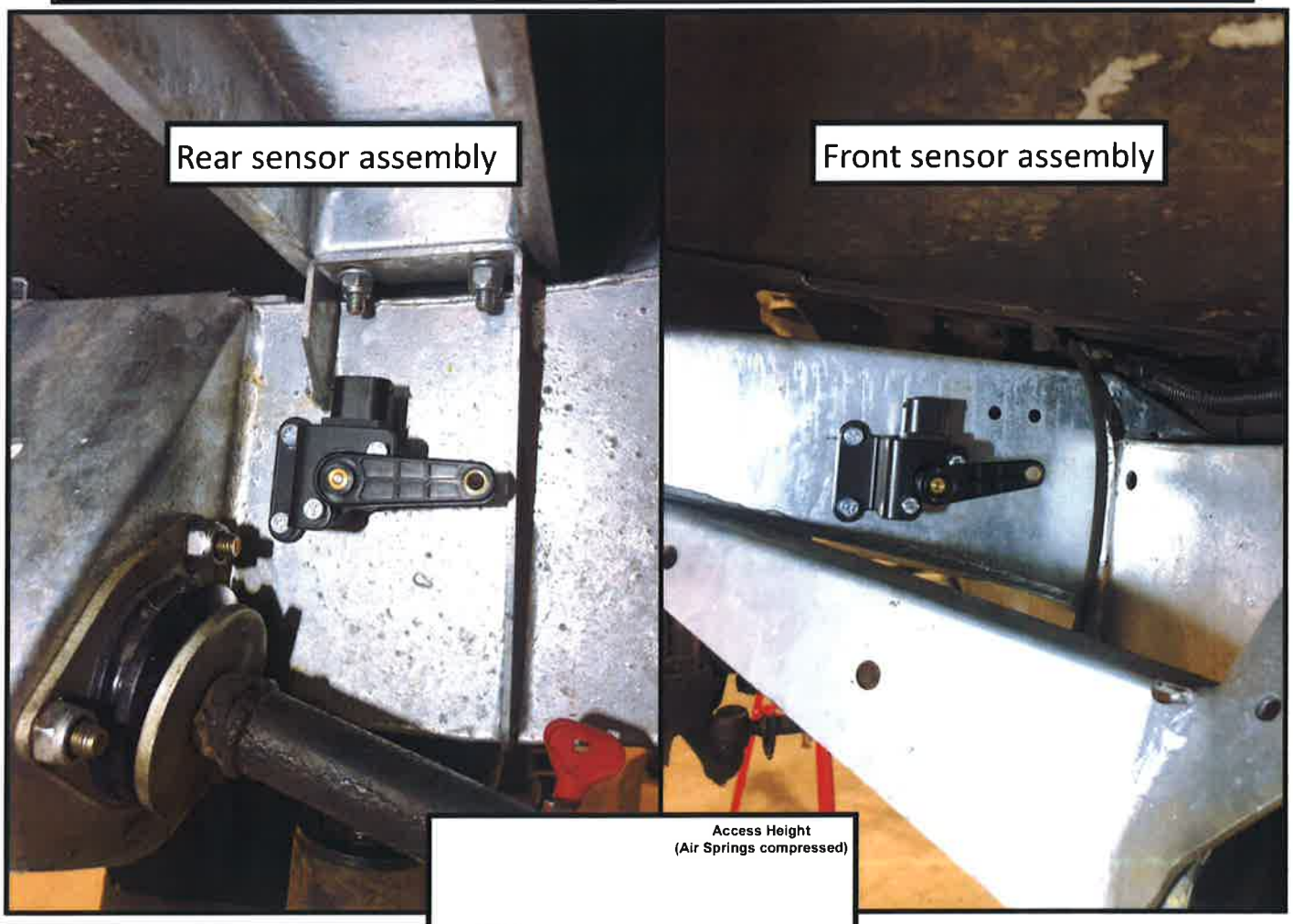
****Before proceeding with electronic controls install, ensure you are happy with all air springs & that the rubber bellows are not twisted or buckled. If lowering vehicle ensure rubber bellows is rolled over piston correctly.****

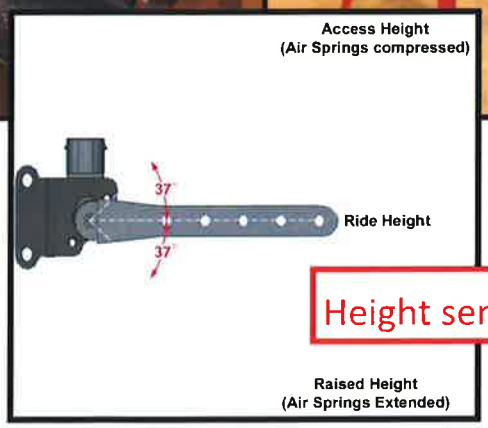
ON AIR SUSPENSION

Optional On Air Ride controls—Installing the height sensors

Before drilling holes for any height sensors, observe that you need to leave space for fitment of the sensor plug & that the sensor arm can move +/-37° during suspension articulation—see below. You do NOT want any clash of the arm during movement. Positions shown are only for guidance where each vehicle may require some variation from this. Ensure sensors do not move beyond +/-37° through full articulation as this will cause running faults of the control system.

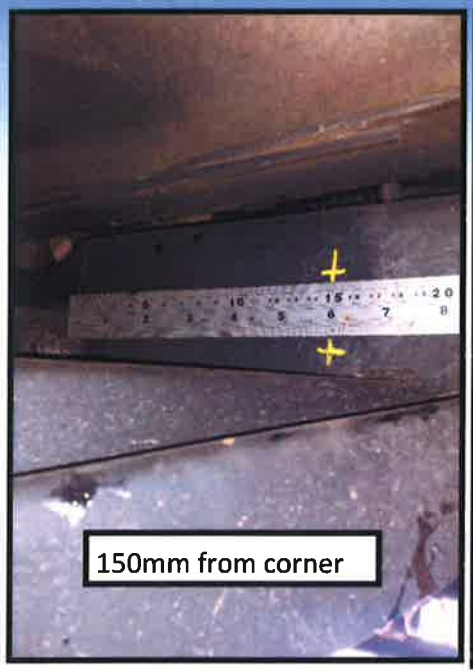
21) To install the front height sensors, you first need to mark-up the position of the height sensors on the rear of outboard chassis member. Drill holes & fit bolts & nuts. Rear sensors are attached outboard of chassis rails. Drill holes & fit rivet nuts supplied. See the following page for more details.

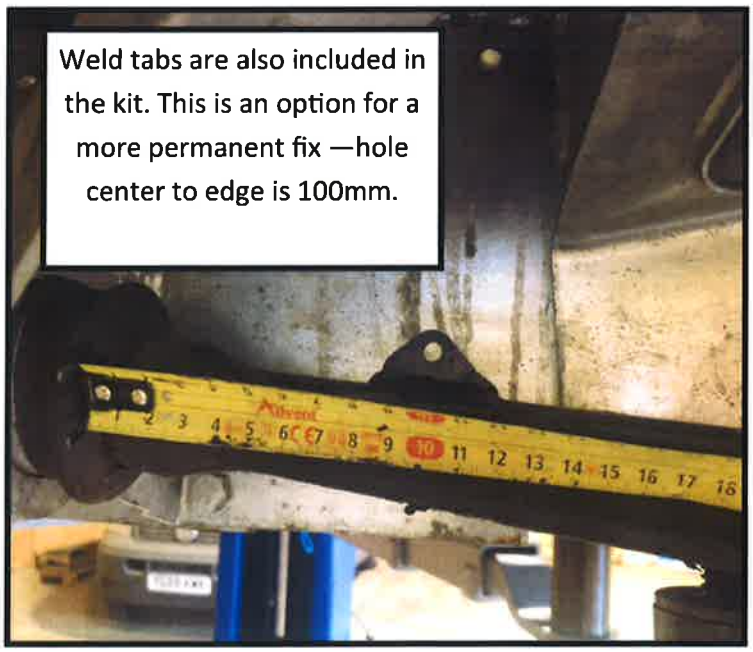




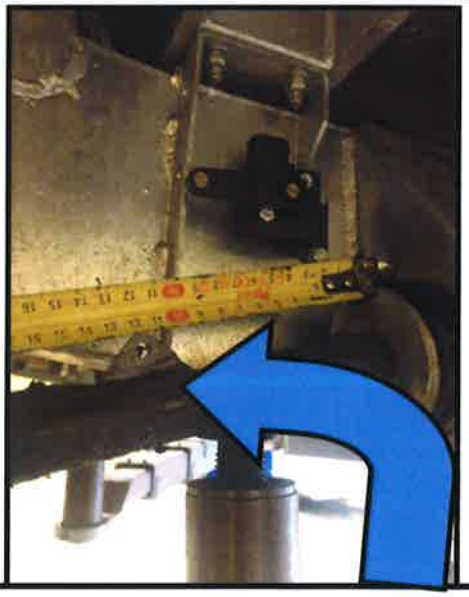
Height sensor maximum range +/-37°

Front height sensor position—rear of outrigger member



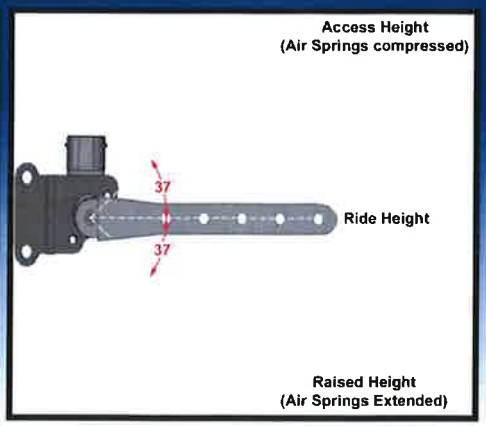


Rear height sensor position—outside chassis rail

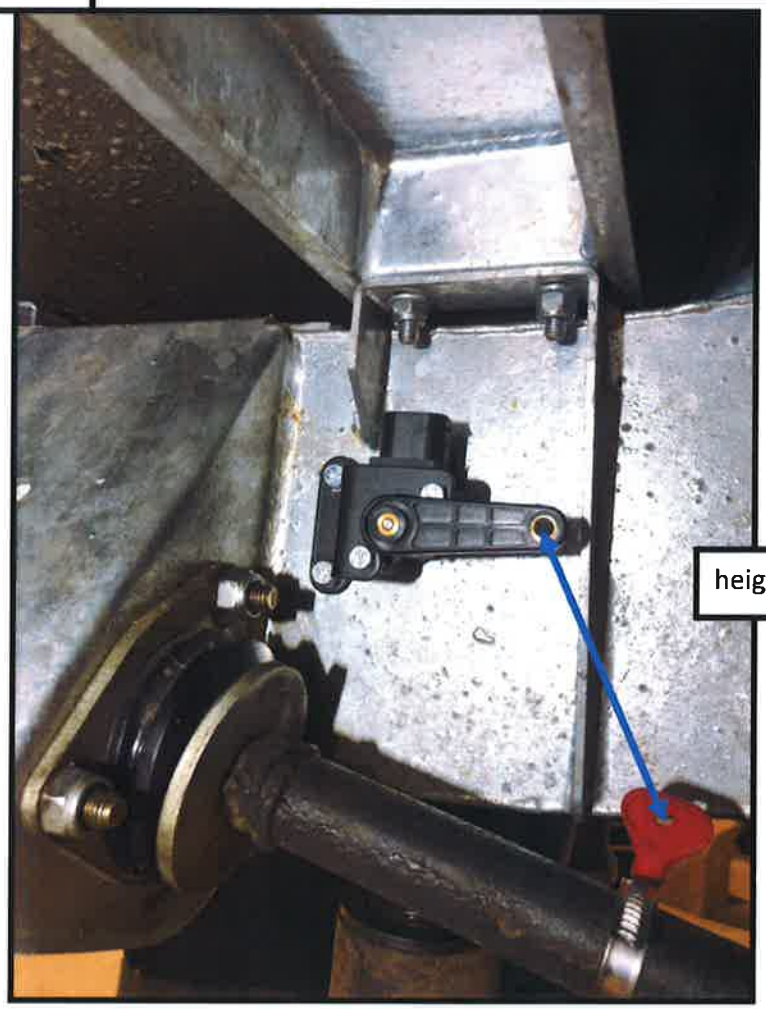


Weld tabs are also included in the kit. This is an option for a more permanent fix — Hole centre to edge is 120mm

22) To find the correct linkage length, you need to 1st raise your axles roughly to ride height where bump stop to axle space is 55mm for the front & 65mm for the rear. Take your height sensor arm and position it perpendicular to the sensor plug. The distance between the height sensor arm and sensor lower attachment is the length of the linkage ball end to ball end.



Do NOT allow sensor / linkage to lock-out through full travel due to risk it will rotate to the wrong side which will cause damage & running faults.



height sensor linkage length

When bump stop to axle distance is as the above-specified distance, the distance shown above is the height sensor linkage length.

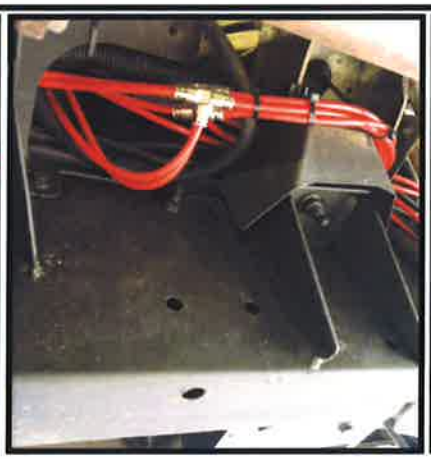
Attaching the reservoir tank and compressor

23) The reservoir tank can be positioned anywhere on the vehicle as long as there is good access to the air line to go to and from the tank. We advise that the tank is attached to the chassis rail for security and in a location which is as protected as possible. We usually attach on the right side & outside on the chassis. Mark and drill holes in the chassis to fit the supplied M6 Riv-Nuts using a Riv-Nut tool. Attach the tank securely to the side of the chassis.

24) Mark and drill the holes for the compressor bracket. This is to be located under the left side of the vehicle outside the chassis rail ahead of the battery box. Once the holes have been drilled, attach the compressor to the vehicle.

Air circuit installation

25) Run the air lines towards the battery box leaving ample tubing for routing to the valve block. Secure the air lines to the vehicle regularly & ensure there is no risk of contact with hot or moving parts. Be mindful not to route in a location where access is required for future vehicle maintenance. **Do not tighten cable ties yet as electric circuit may run along same route**.



26) The 4-corner valve block has 6 connection points. Secure the valve block in the battery box area. Take care to leave space for the electrical connections & neat air line attachments. OPTIONAL EMERGENCY INFLATION PANEL: Install a T-piece on the air lines from each air spring to allow for an additional line to go to the emergency inflation panel.

Connect the air lines as follows:

> Connect the valve marked 'COMP.' to the compressor.

>Connect the valve marked 'RES.' to the reservoir tank.

> Connect the valve marked 'L.R.' to the left rear air spring.

> Connect the valve marked 'R.R.' to the right rear air spring.

> Connect the valve marked 'L.F.' to the left front air spring.

> Connect the valve marked 'R.F.' to the right front air spring.

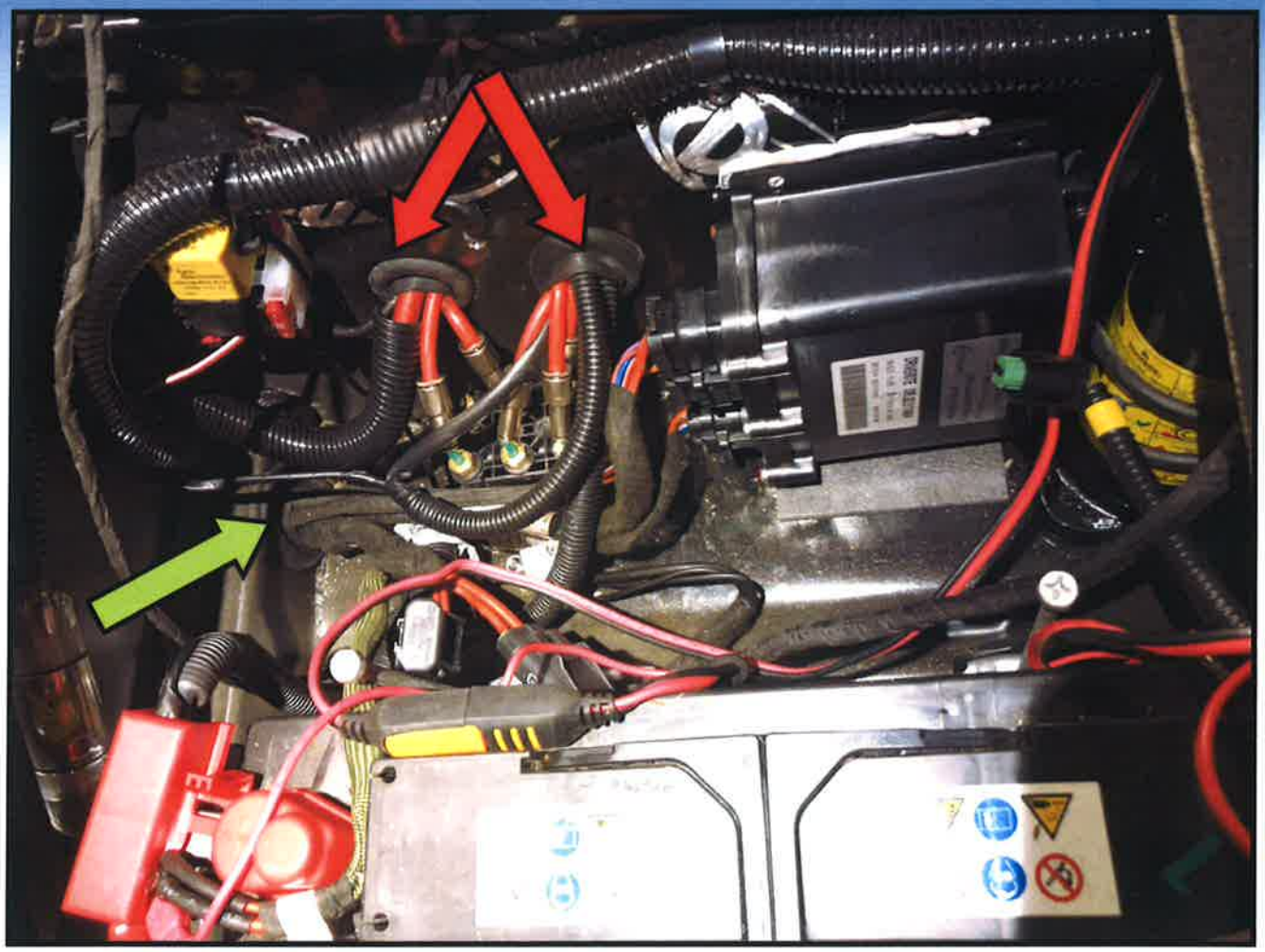
Installing the electrical harness

The electronic system will not become active until the ignition live has received a signal. You may choose to remove both fuses that are built into the harness while completing the install—carefully note fuse sizes for each fuse holder for later refitting as they do differ.

27) The harness is routed starting from the compressor. Connect the large compressor connection on the harness to the motor of the compressor followed by the small compressor connection to the solenoid on the air drier. These connections will 'click' when fully inserted.
Connect the valve block & ECU 2 plugs to the harness. Also, connect the live (red +) ring terminal connections direct to the battery followed by the ground (black) ring terminals to the body.

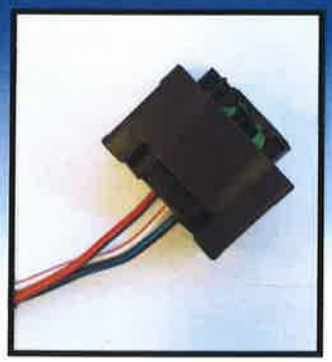
Route the Height Sensor connections and the Horizon Levelling Sensor connector to where they are intended for the Height Sensors and Horizon Levelling sensor (OPTIONAL) to be located. Route all four corners and the Horizon Levelling connection (optional) —fitment details on following pages. ENSURE NO PULLING OF CABLES, SOLID REGULAR ATTACHMENT TO THE VEHICLE & NO RISK OF TOUCHING MOVING PARTS. CABLES SHOULD BE CLEARLY AWAY FROM THE COMPRESSOR.

ECU and Valve Block Placement



When it comes to ECU and valve block fitment, we at On Air Suspension usually install them in the battery box under the passenger seat as shown above. You can feed the ECU plugs, valve block plug, communications port, lives, earths and fuses through the front right hole (green arrow) and fit the air lines through two separate existing grommets (red arrows). We find that this is the neatest and most secure way of setting up the controls system on the Defender.

Harness plugs labelled

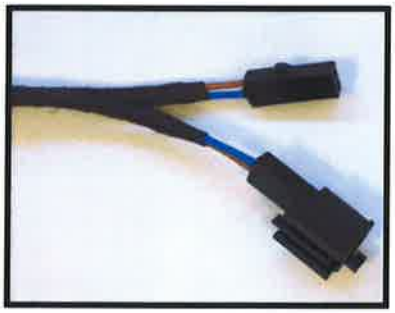


Height sensors (location labelled)

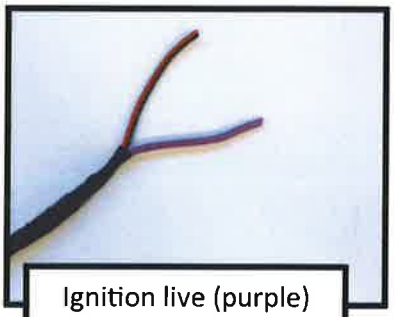
ECU

Valve block

Earths

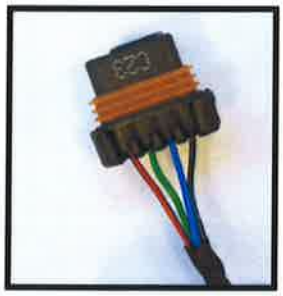


Hand brake (blue wire)

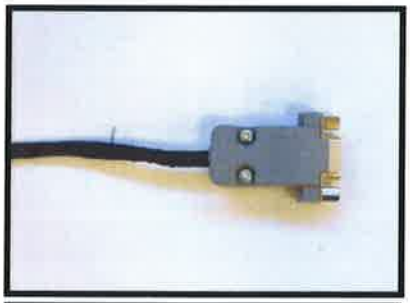


Ignition live (purple)

Speed (black and red) - do not connect

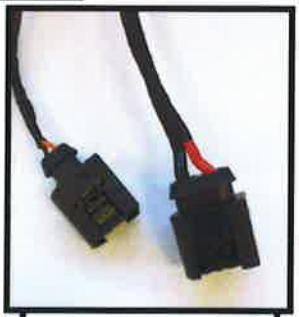


Horizon levelling



Com port (PC & HH controller)

Main live +



Compressor (right)

Compressor drier (left)

Service switch

Fitting the horizon levelling system (optional)

28) The horizon levelling sensor is an optional extra. If it is not supplied please skip to the following step. There are 2 labels on the horizon levelling sensor. One of these labels indicates the side of sensor which must face foreword and an arrow indicating the up direction. This label must be facing the front of the vehicle. If the sensor is not mounted in the correct orientation it will not function correctly. The sensor must be mounted on a flat surface near horizontal. This sensor can be bonded onto a cross member, also ensuring that it is a solid member and won't intrude future work. Make sure the area is clean before bonding. We suggest using a strong bonding agent such as Stixall. Connect sensor using the correct plug on the main harness.

Calibration

Contact us for assistance during calibration. We can provide a remote session using a PC, Wi-Fi & the supplied connection cable. You can also refer to the additional On Air Ride instructions for calibration via the optional hand held controller although will not be as accurate as our remote calibration. See below guideline chart* for suggested height settings on the Defender. *Heights may differ depending on bump stop set-up etc.

	Bumper/axle	
Height	**Front**	**Rear**
Manual minimum	5	5
Access	10	10
Ride height	60	65
Off-road	95	100
Manual maximum	110	110

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On Air Suspension Limited

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