RHD ENGINEERING
Racing Hardware Developments

BMW M20 ITB Kit

Assembly instructions

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NOTES:

Thank you for choosing an RHD ITB Kit. All RHD parts and products are designed for performance and racing purposes, what you do with your vehicle is your responsibility and no liability will be taken by RHD Engineering for your actions.

This kit is designed to work with a stand-alone ECU however people have managed to make it work with the std ECU in combination with an additional tuning device. Slightly larger injectors are strongly recommended. Installing a stand-alone ECU configured with Alpha-N will always bring the best results. Do NOT try to use MAP as the only signal for tuning ITB systems. Most quality ECU brands will have no problem running pure Alpha-N. However some brands may struggle with resolution so a combination of TPS and MAP is needed at the very least. We recommend EcuMaster as an affordable high quality ECU and we can offer support and tune files for all our ITB kits.

The throttle bodies are made to very tight tolerances and have been PRE-SET for normal engine running temperature. They may feel a little bit tight or sticky when fully closed. This is perfectly normal DO NOT try to adjust them.

To install and set up this kit you will need a good understanding of mechanical devices, the appropriate mechanics tools and weber/ITBflow synchronizer tool (see following picture). Parts needed: some 8mm vacuum hose, pod filter, an e36 TPS (PN 13-63-1-726-591-M375) and slightly longer throttle cable from a 318is 4cyl (m42). LH drive vehicles P/N 35411158724. And for RH drive vehicles you will need this one P/N 35411164636.

Please check all the parts are included and contact us immediately if you have any pieces missing.

Manifold	3 pcs
40/42mm ITBs	3 pcs
Trumpets	6 sets
Trumpet spacers	6 pcs
50mmx2mm O rings	12 pcs
Linkage brackets	2 pcs
M5 drop link set	1 set (2 rod ends, 2 nuts, 1 link, 2 cap screws)
Spring balance adjuster	2 pcs
Flat arm coupler	1 pc
TPS fixing plate and screws	1 pc
Linkage mechanism	1 pc (bracket shaft return spring and cable quadrant)
ITB master lever set	1 set (Idle stop, screw, secondary spring)
Long lever	1 pc
M6 x 12 Hex bolts/washers	2 pcs
Fuel rail brackets and bolts	2 pcs each
9 port vacuum block	1 pc
8mm x 1/8 bsp hose tails	6 pc
8mm x 1/4 bsp hose tail	6 pc
10mm x 1/4 bsp hose tail	1 pc
Tee fitting 1/4 bsp MFF	1 pc
6mm x 1/8 bsp hose tail	1pc
4mm x 1/8 bsp hose tail	1 pc
16mm x 3/8 bsp hose tail	1 pc
ICV/ CCV hose patch fitting	1 pc
M8 x 25 cap screws	12 pcs
M6 x 20 cap screws (trumpets)	12 pcs
M6 x 16 cap screws (spacers)	12 pcs
M5 x 16 cap screws	10 pcs
Plenum backing plate	1 pc
Plenum	1 pc

Assembly Procedure:

NEW!... Youtube installation video will be available very soon. Keep an eye on our website under downloads and FAQ pages www.racehead.com.au

First install the adapter and TPS onto the last throttle body before you install anything else. Ensure that the TPS is positioned so that the throttle can move freely from the closed to fully open position.

NOTE current version kits have a non adjustable adapter and TPS is pre-set to the correct position. Output voltage should be about 0.5v

Assemble the throttles as per the following pictures. Make sure the throttle with the master lever is fully closed with the idle stop screw just touching the little round stop. Adjust the balance adjuster screws so they protrude about 2mm towards the J spring, leave the balance adjusters only slightly tight on the shafts for the moment.. Before installing the manifolds fit all the little brass pipe fittings and T fitting to the underside following the diagram. Install the manifolds first then attach the throttles. Make sure the little coupling tabs are wedged firmly between the adjuster screw and the J spring (NOT in the centre of the J spring loop) Install the linkage mounting bracket on the centre throttle. Loosen the adjusters and push on all the throttles with your finger to make sure they are all fully closed before you tighten the adjusters firmly. Next install the linkage and idle circuit parts and hoses. Install the spacers using the shorter m6 x 16 cap screws, making sure the arrows point towards the engine, no backing plate, trumpets or plenum for the moment.

TIP: On No 6 spacer replace the bottom cap screw with a small M6 Hex bolt since access to this is very difficult and a bolt can be easier to tighten with a little spanner.

Now you can start the engine and synchronization the throttles, you might need to fully or partially block the inlet of the ICV for it to rum and idle. Use the outer throttle cable adjuster to tension the cable until the engine is running at least 1000-1200rpm. Allow the engine to warm up to normal running temperature before synchronizing.

Adjusting the balance is EXTREAMLY sensitive and near perfect synchronization is essential for smooth idle and good light throttle driving. To do this you MUST use a flow synchronizer such as the one pictured. Measuring vacuum is not a good indication of flow.

Press the synchronizer into cylinder 3&4 first. Adjust the balance couplings until the flow into the front pair and rear pair match the middle pair. Adjust the cable back down so the throttles are fully closed again.

Plenum:

Remove the spacers then build an assembly of the backing plate spacers and trumpets leaving all the screws loose. Bolt the plenum to the backing plate and fully tighten. You can use RTV type sealant or make a compressible gasket between the backing plate and plenum, not essential using a stand-alone ecu but recommended when using the OEM ECU. Install the whole assembly back onto the engine again making sure the screws between the trumpets and spacers are loose. Install all the screws before any of them are tightened. Tighten all the screws starting from the throttles, tighten the spacers onto the trumpets last

Assembly Notes:

Study the following drawings very closely they show the exact placement of all the fittings and linkage parts The small return spring on the master ITB is only intended as a SECONDARY spring to ensure the throttles close should any linkage part becomes loose or disconnected. A second main return spring is included in the upper mechanism this can be preloaded up to a maximum of 180 degrees to add the desired amount of pedal resistance.

For nice progressive throttle action keep the drop link as long as possible. However if your ITB does not reach full throttle when the pedal is fully depressed then adjusting the drop link to a slightly shorter length and resetting the cable slack will alter the mechanism gain and will enable the throttles to reach full open.

Make sure the linkage moves freely and smoothly without any binding. When installing the upper lever make sure its not pressed hard against the bearing on the bracket. Light lubricant such as WD40 on moving parts is good. It is important the ITB linkage doesn't reach full throttle when there is still lots of extra travel on the pedal this will over load your cable and linkage resulting in possible damage or premature cable failure.

You will need to drill some holes in the plenum and /or backing plate for the Inlet Air Temperature Sensor and also the patch fitting for the Idle Control Valve inlet hose. If you are using the std ECU It is important that the ICV draws metered air AFTER the AFM sensor.

Crank case breather can also be plumbed into the plenum or alternatively run to a vented catch can mounted in the engine bay

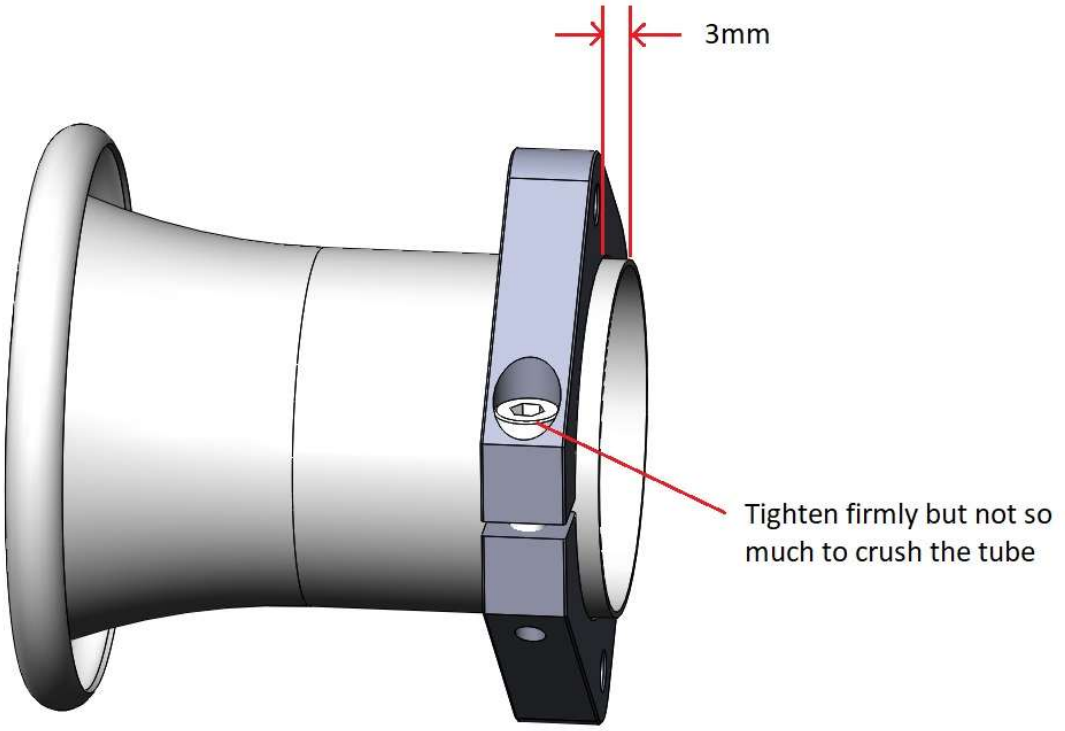
Brakes:

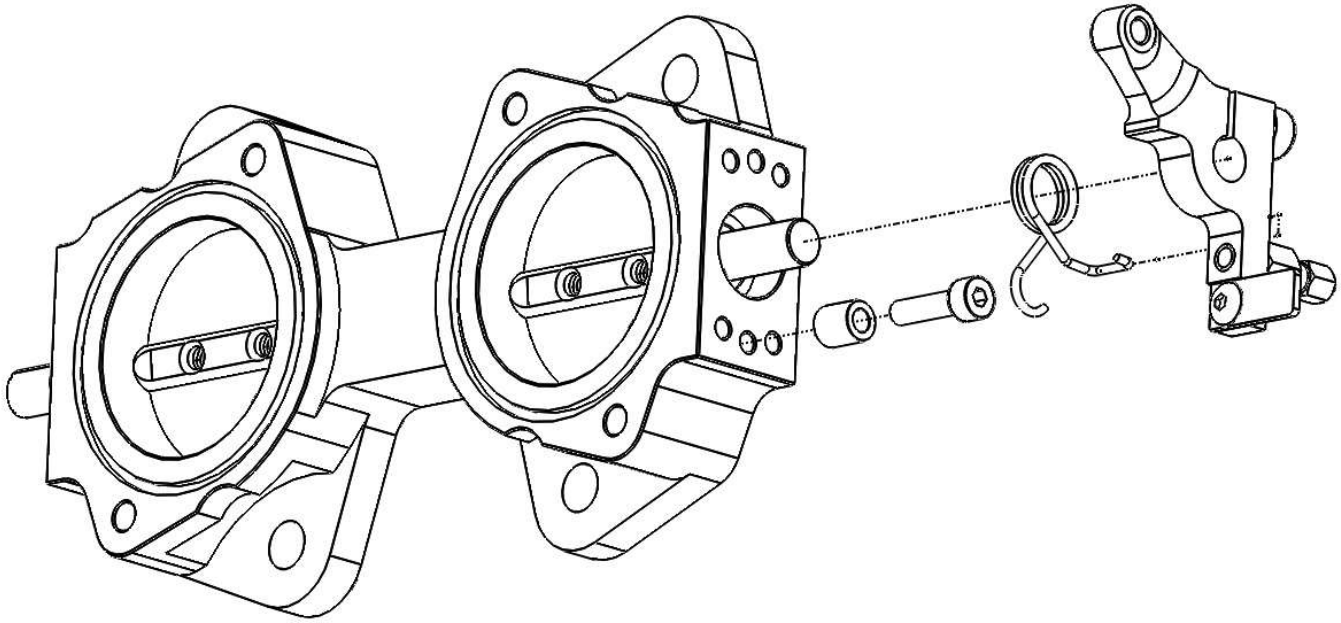
For correct brake booster operation you will need to follow the diagram! Attach the vacuum hose to the T fitting provided on the manifold/adapter. The booster will work exactly as OEM running from just 1 cylinder. The vacuum from 1 cylinder is much stronger than the signal from the vacuum accumulator block! It is essential that the small plastic 1-way valve fitted to the factory booster line is maintained.

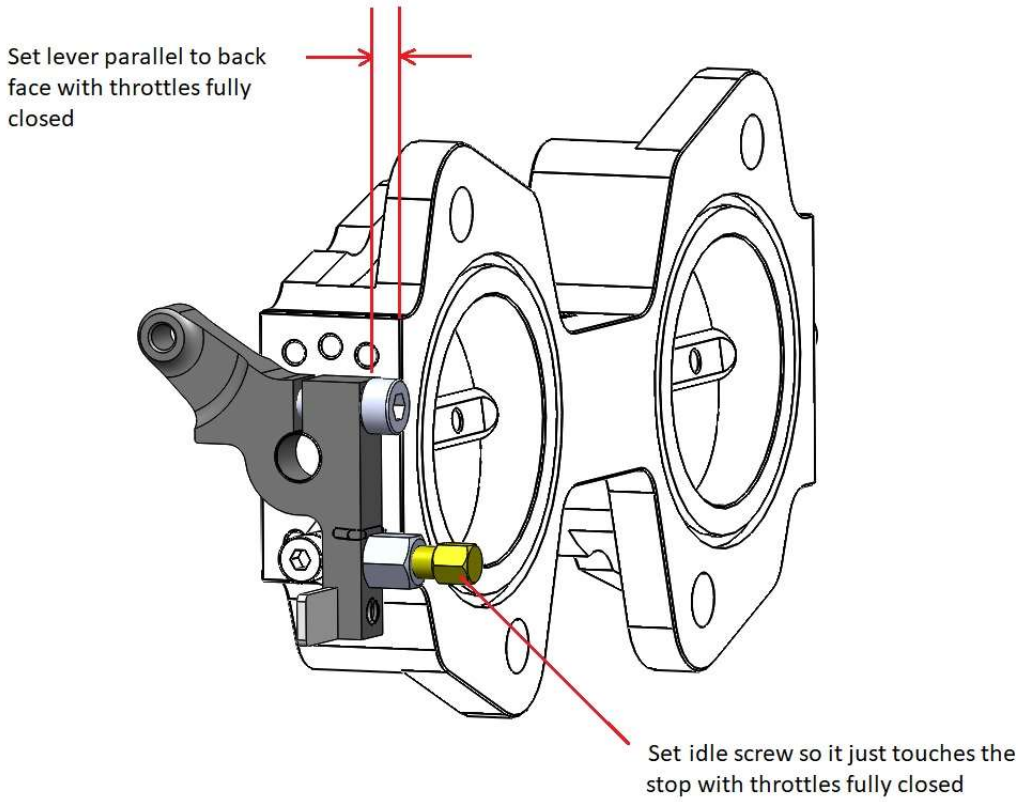
DO NOT connect the booster line to the vacuum block!

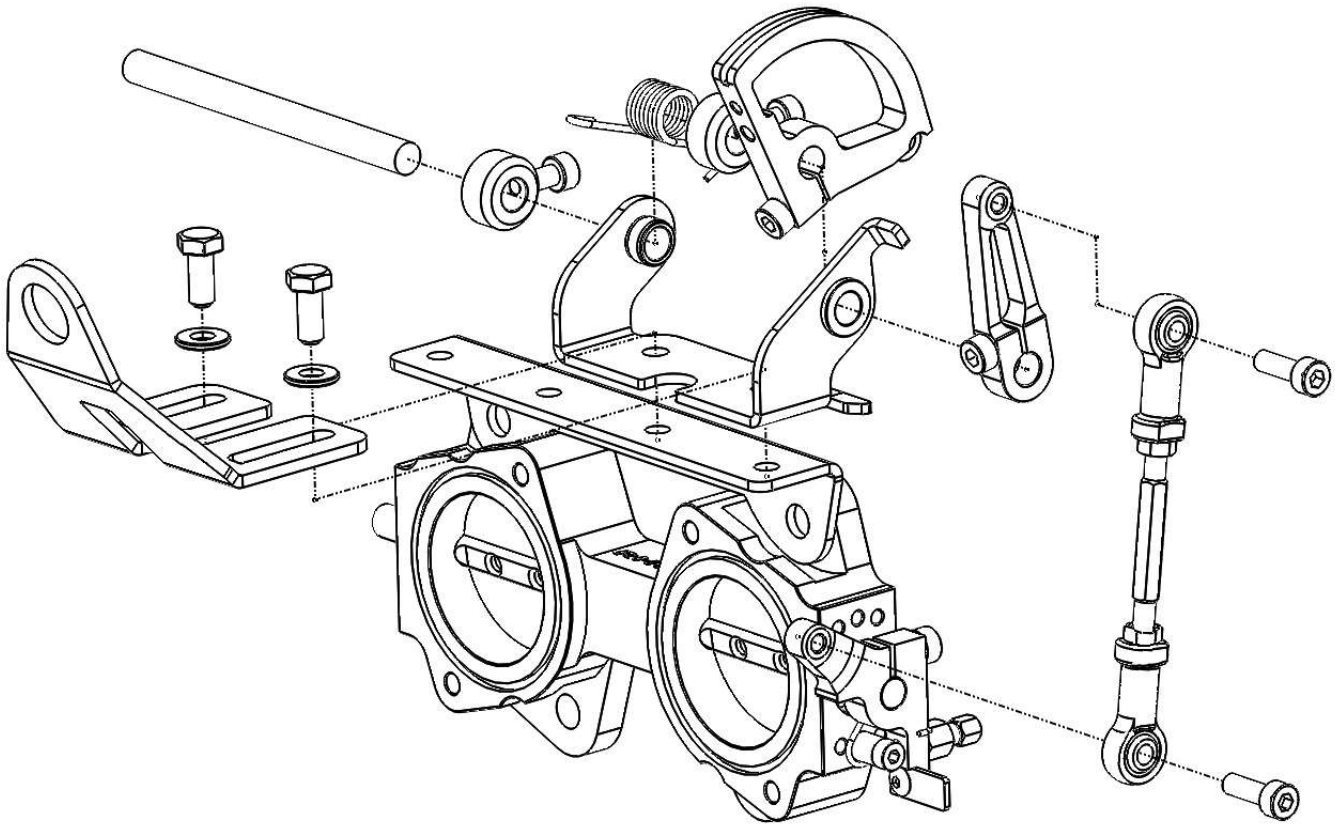
Happy motoring ☺

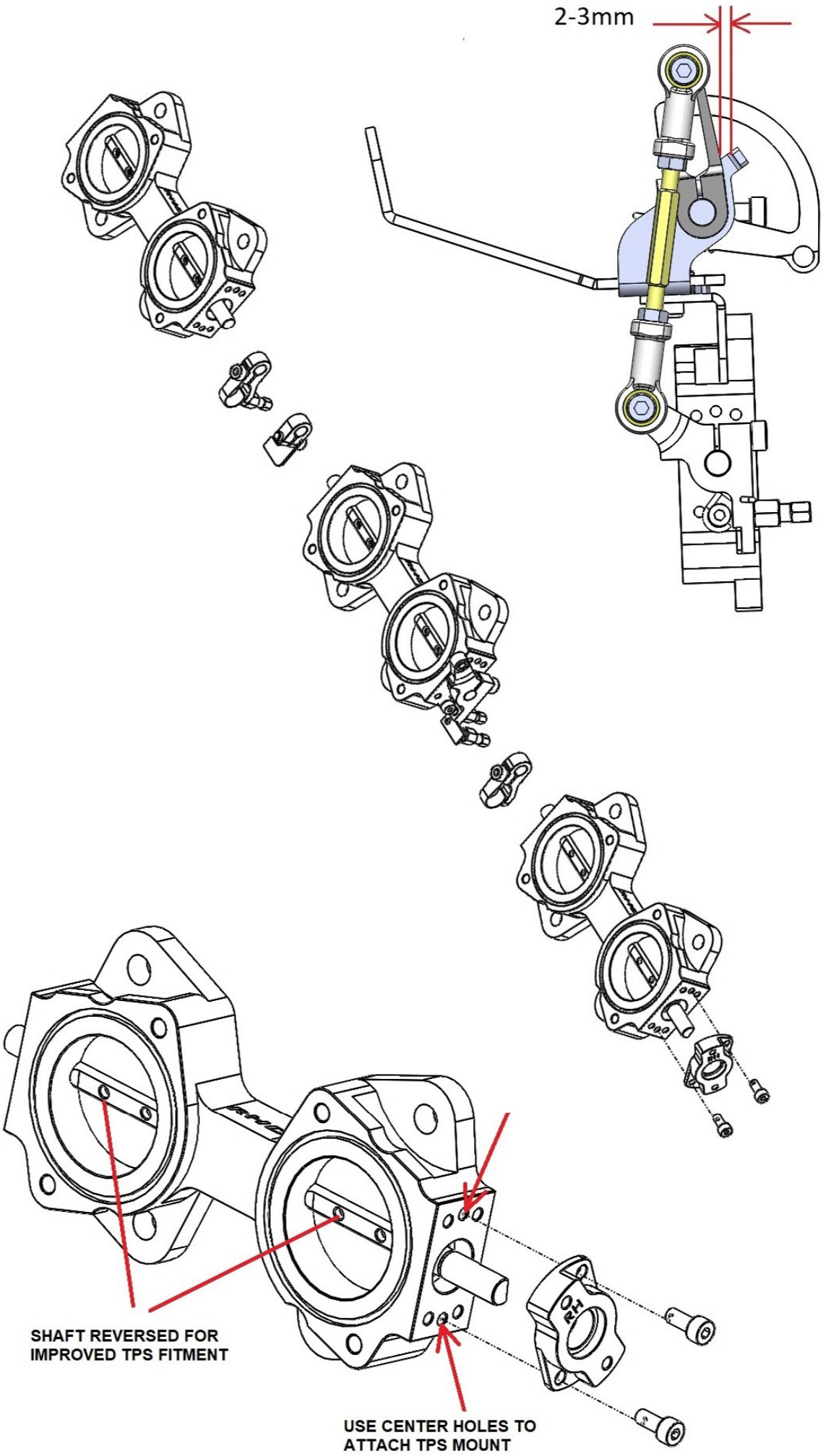
Any questions or problems or suggestions don't hesitate to contact us, email is the best method

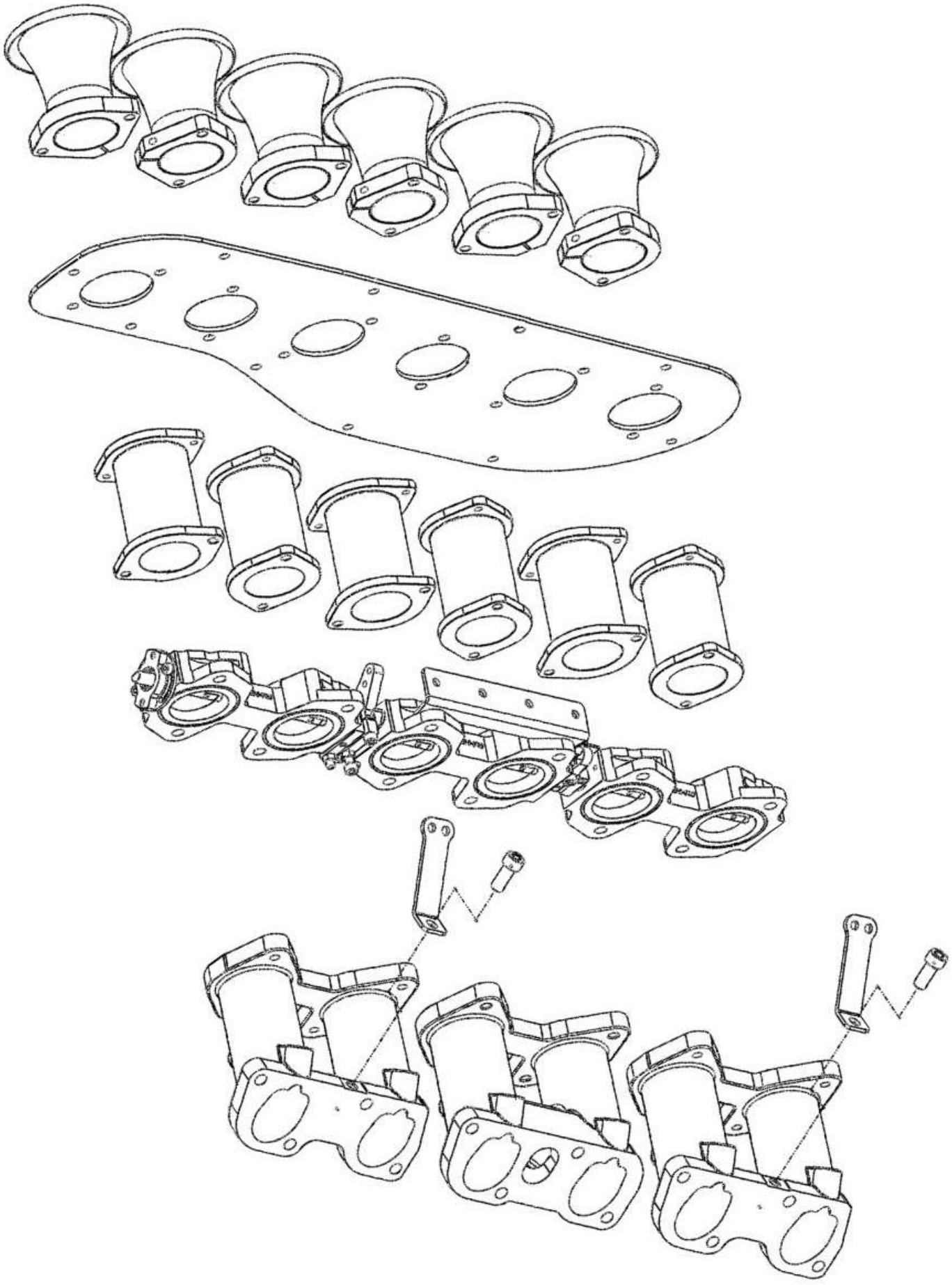

3mm
Tighten firmly but not so much to crush the tube

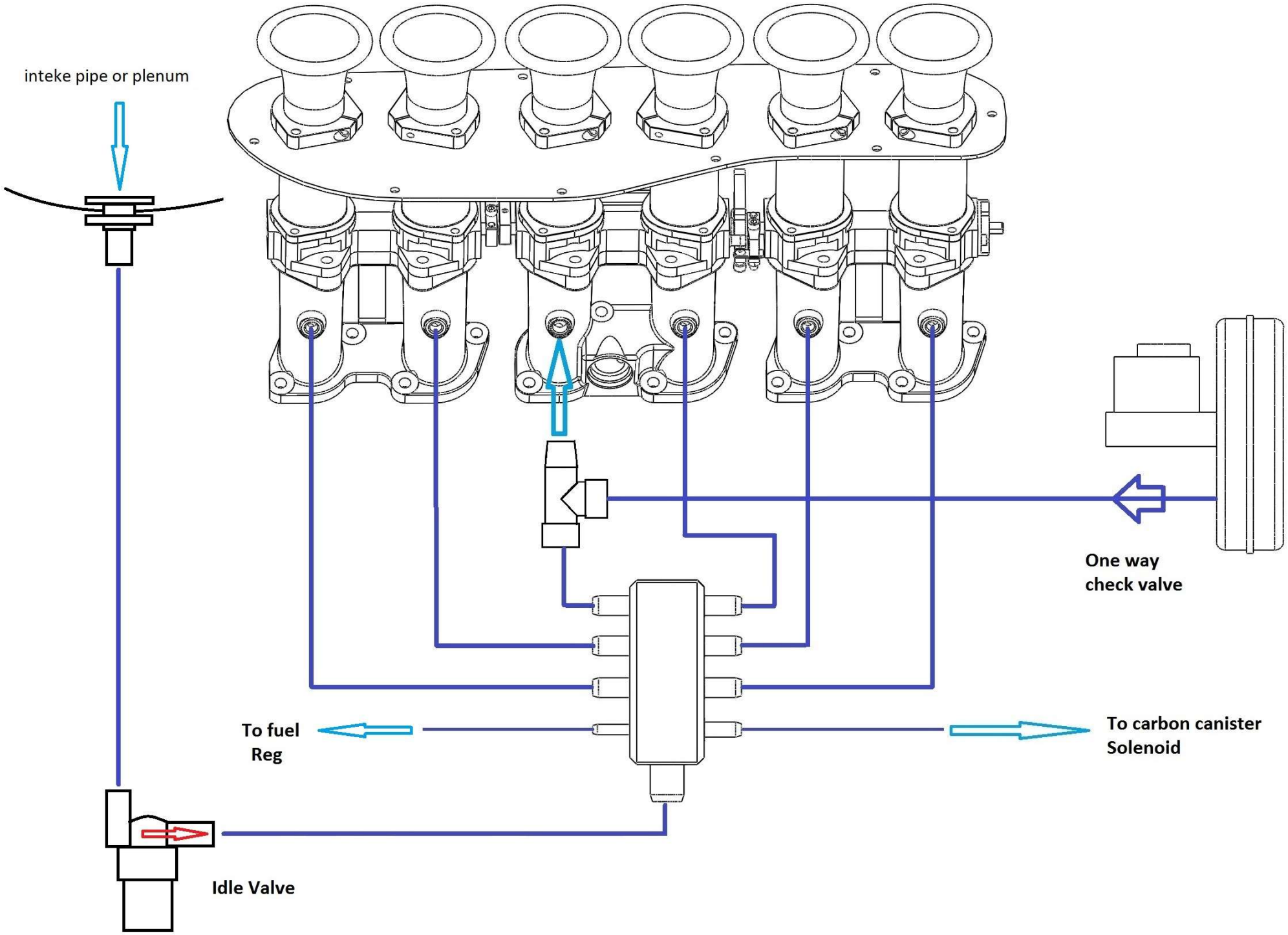



Set lever parallel to back face with throttles fully closed
Set idle screw so it just touches the stop with throttles fully closed




2-3mm
SHAFT REVERSED FOR
IMPROVED TPS FITMENT
USE CENTER HOLES TO
ATTACH TPS MOUNT




inteke pipe or plenum
One way
check valve
To fuel
Reg
To carbon canister
Solenoid
Idle Valve