HYDE MOTOR WORKS

The Original Roots Supercharger Project for BMW's

HMW V2 SUPERCHARGER KIT
INSTALLATION GUIDE

This design came into being from a project to build a cost efficient-bolt on supercharger modification in order to get some more power out of the stock BMW M50/M52 based motors. This is our "tried and tested", simplified & final version for general public usage. It has over "two hundred plus"-man hours involved, in order to iron out any wrinkles and get it just right for production. Since its inception, the SC14 setup has seen numerous users worldwide and even competed in racing circuits and shows in North America as well as in Europe. As a way to get returns on the investment, we decided to make the first V2 kits available to the general public in 2016. This product is targeted towards all BMW enthusiasts and owners around the world, wishing to get more performance out of their cars.

The V2 series of brackets requires no welding at all and is only to be cut and bolted for a nice tailored setup for the M50/M52/M54/S50/S52/S54 motors on various E46/E36/E34/Z3/Z4/E38/E39 chassis. The Toyota Estima/Previa SC14 supercharger we are using is capable of moderate power increase, with boost levels of 3-8PSI, with the option of smaller pulleys.

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About the SC14 Supercharger

This is a compact heavy roots type positive displacement supercharger. It has the ability to spin both ways and still output air pressure. This SC14 also incorporates a nifty feature which is a magnetic clutch system. When it is wired to a switch, it lets you turn it on and off, as you desire. Some people wire it to the throttle position sensor and this way have it on at full throttle only. Others delete the clutch system altogether, for higher boost setups.

Originally designed in Germany by Wankel AG and licensed to be manufactured by the company *Ogura-Clutch*, it is actually more commonly known as the Toyota SC14 supercharger. The SC14 is less efficient than the Tri-lobe type from Eaton. Yet, the SC14 is still a very robust and inexpensive charger, with a displacement of around 1420cc. The SC14 is therefore larger than the 1000cc Eaton M62 and closer to the Eaton M90's(1470ccc).

Weight: 12kg **Displacement:** 1420cc **Dimensions**: 31cm L x 15cm W x 25.5cm H **Max Safe Operation:** 12,000 rpm	**Theoretical Discharge cc/rev** 1160 - 1460 **Maximum RPM Continuous** 11,000 - 10,000 **Maximum RPM Instantaneous** 14,000 - 13,000 **Maximum Pressure Ratio Continuous** 1.8 **Maximum Pressure Ratio Instantaneous** 2.0

The 2 types of SC14 Superchargers

There are two variations of the SC14 supercharger. Our setups from 2019 support both. Commonly we use the SC14 unit with the 6 Rib Pulley, which has the cross and yellow dipstick. This is Type 1, commonly found in the Toyota Estima and Previa vans of the 90's. The Previa has tabs that are somewhat lower and facing more towards the engine side.

The other SC14 supercharger variation is Type 2, often found in the Toyota Crown, such as the GS120, GS121, GS130 from 1988–1990, the Toyota Mark II/Chaser/Cresta GX81 and the Toyota Supra from 1985-1989. This Type 2 SC14 has a bottom mounting tab that is straight and sits higher and as such requires our Type 2 adapter, which is included in all our kits.

More information on using the Type 2 SC14 can be found in the Specialty Builds section.

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Pulley Options and Boost Output

A rule of thumb for superchargers: The smaller the pulley and the faster you spin the rotors, the higher in general the boost pressure you output. The stock pulley supplied is 113mm and keeps boost under 3PSI. This is good to detect leaks and slowly tune up the car. Ideally you would want boost around 5–8PSI for the best balance between power, blower efficiency as well as engine and drivetrain longevity.

Custom pulley: A variety of pulleys are available for the SC14 supercharger. There is the HMW 80mm pulley available which is good for up to 9PSI non intercooled or 6.5PSI intercooled. There are also some other pulleys available on the aftermarket, yet all of them require the right sized bearing, so that it easily slides over the sleeve of the SC14 housing while reusing the grooved cross face that can be found inside the stock SC14 pulley. Some pictures below:

Stock pulley cross face piece (on the left)

HMW 80MM SC14 pulley

Note on bearings: HMW 80mm pulley requires a NSK 30x52mm bearing on the Type 1 SC14 and a NSK 40x52 mm bearing on the Type 2 SC14. This part is included.

Air-con pulley: There are also some air-conditioners that have pulleys which can be a direct swap, such as the early 1990's Holden VN V6 Commodore. Some of the 1990's Fords use the same Sanden TRS105-3207 AC compressor. They, however, need a roller bearing, sized 30x55mm. Then there is the Toyota Corolla SCS air-conditioner pulley found in the early 2000's Corollas and which measures 93mm. It can be directly swapped.

However, you will not be able to retain the magnetic clutch in any of these pulleys, unless using a 12V – 24V stepper, as it will slip. Additional to this option, one can always use custom pulleys or those from various cars, requiring some work and right bearing, as long as the number of ribs are the same or more.

List of Pulley Sizes and Expected Boost in PSI

- Stock Previa SC14 Pulley 113mm = 3PSI
- Holden VN air-conditioner Pulley 103mm = 4PSI
- **Toyota Corolla SCS air-conditioner Pulley 93mm = 5.5PSI**
- **HMW 80mm SC14 Pulley = 8.5PSI**

NOTE: adding an intercooler will have a boost-drop of around 2-3PSI to the above given numbers. All numbers above are from our tests and experience, your results may vary.
If you are looking for a guide on how to service the SC14 or for any pulley modifications, please take a look at:
https://hydemotorworks.com/2017/02/05/sc14-supercharger-diy-servicing-tutorials/

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Pre-Installation and Making Room

Please ensure that your car is 100% healthy, before you even begin installation. Start off with a good engine and car, ensure that all common seals and gaskets have been replaced or at least aren't leaking and that the car runs well, with no vacuum leaks nor any engine or transmission issues. A cheap "party smoke and fog" machine from online stores can help detect typical vacuum leaks. Also, before commencing installation, it's a good idea to plug in a code reader to read and clear any error codes. Using software such as INPA on an old laptop, with some inexpensive cables, is also a great step towards self-diagnosing your own car. Before starting the installation, a tip is to make sure you disconnect your cars battery terminals and put the battery on a car battery charger.

Considerable Preventive Maintenance

As a preventive maintenance we first suggest, as the bare minimal, to replace all the potentially leaky gaskets in your car, such as the valve cover gasket set. Don't forget the new O-rings, oil dipstick O-rings, oil filter housing (if leaky), etc. Clean your injectors and later even replace them with bigger ones. Clean your MAF sensor and ICV, and use new spark plugs. Finally replace your fuel filter, cam and crankshaft position sensors, if they are still OEM. It's not required, but you would hate to be stuck in traffic or at the side of the road, should any of these two sensors fail. Sometimes even the old original o2 (oxygen) sensors can fail. We are not suggesting to replace all sensors just to prevent what may go wrong, but ask to consider such down the line. And sometimes even the old wiring harness can fail as well as brand new sensors can fail.

Also note: You may consider replacing your **belt tensioner**, which requires a minimal effort and time. **Replace this part especially if it is still the factory original,** else it will cause slippage and boost loss. We recommend you pick only the mechanical spring-loaded tensioner instead of the hydraulic tensioner. Consult your parts supplier or online for more information. **This may also be a time to check if you have the extra pulley on your alternator; if not, add it. Some cars came with it, some didn't.**

Before going into installation however, we have some suggestions how to make room as well as some required and recommended modifications that will help get the most out of your setup:

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Making Room

If your car has ASCT near its throttle body, then we suggest to delete it. Search on the internet for extensive guides on how to do this.

Also, relocate your charcoal filter and EVAP to the rear, using a small bracket. Simply use some extra hose piping and brass connectors and have it all tucked away.

In order to make room for the intake piping, you must remove your headlight adjuster and relocate your horns with additional wiring to the front of the car, near the sides of the AUX fan. I have also moved the brake duct to flow cold air into the pod filter, similar to the M3.

Supporting Mods

M50 Intake Manifold (Optional)

If you are installing on a US E36 M3, a M52 328i or a 323i then we suggest installing the larger **M50 manifold from a 325i** in conjunction with the supercharger. The M50 manifold gives around 50% increased airflow to the engine opposed to the stock M52B28 manifold, which is quite restrictive. It also nets you some noticeable HP gains on a NA motor over 3000RPM, at the expense of losing a little torque under 2500 RPM. With the supercharger you will only benefit from having a higher flowing manifold.

Note: When purchasing a M50 manifold, **ensure** to get the manifold from the **2.5L 325i (M50B25 engine), not** the **2L M50B20** found in the 320i, since the latter is smaller.

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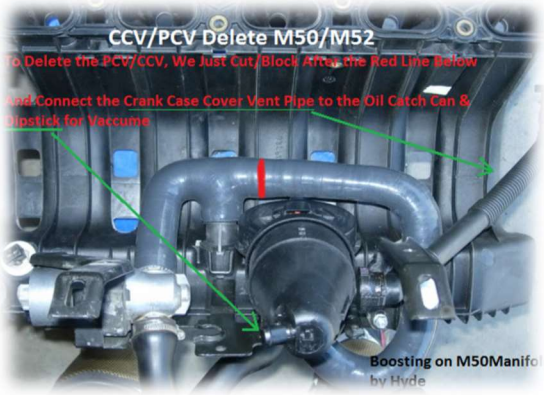
CCV/PCV Delete (Required)

The factory CCV/PCV system found in newer OBD II cars, such as the 323i/328i/528i/523i etc., often goes bad in these cars, therefore many people like to delete it. If you are running any kind of boost, **it's required** to no longer keep the crank case vent line connected to it. With added positive pressure from the boost this will start to pressurize your crank case, preventing the engine to vent out and causing all kinds of problems and leaks. Its highly recommend that you delete the described factory CCV/PCV system entirely, which is very simple to do. If running the M50 manifold kit, simply cut the vacuum hose in a way so that the CCV is not included in the loop. Block the line coming its way or reroute it, using fittings to a U-shape so that only the ICV and manifold are connected. Be sure to block the line coming out of the dipstick.



Crankcase Venting (Required)

To vent the crankcase, you can simply vent the gases into the atmosphere if your emission regulations allow that, or have the line connecting to the intake side of the supercharger. If you vent to atmosphere be sure to use either venturi on your exhaust, to draw the toxic fumes, or to use a small filter that is routed to the underside of the car, to prevent cabin air being contaminated. You can also reuse the BMW OEM plastic CCV can or add a baffled oil catch can. This will require however, that you drain the can periodically. Sometimes we have tried a slightly different approach and have set up a modified oil catch can, where the bottom drain hole has a fitting that connects it to the oil dipstick (for OBD II cars that has this) while the top simply is vented. This way, one does not need to drain the oil regularly.

There are a lot of online videos on PCV delete as well as many detailed online guides. It's a simple job, but most critical for any kind of forced induction system on these motors. Failing to do this can cause catastrophic engine failure.

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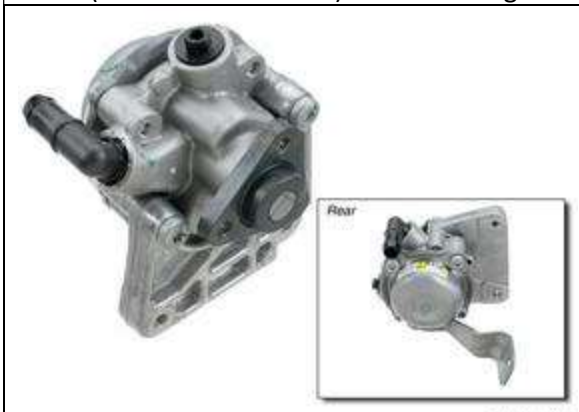
M52/M54 Power Steering (LF30 Preferred)

The M50 engines use the LUK 32411137952KT power steering pump. The V2.1X-E (2020 Edition) of our brackets may be fitted to the M50/S50 engines, utilizing additional spacers to space out and reuse the M50 power steering pump and oil filter housing. An HMW M50 bracket (sold separately) can also be purchased.

Officially, to use the V2.1 on the M50/S50, we recommend to use the LF30 pump, which is an M52/M54 oil filter housing. Also note, certain M54s have the LF20 power steering pump that can be swapped with the LF30 pump. The downside of having the LF20 and more so, the LUK 32411137952KT, is that they are prone to brakeage. Due to the cast housing, it may require some trimming of the bracket / housing on the side to get it to fit properly.

LF-20 (W01331598589LUK) – On M54 Engines	**LF-30** (W01331662628LUK) – On M52 Engines
	

M52/M54 Oil Filter Housing (Required) – M50/S50 Motors Only

If you are installing this kit on a M50/S50 type motor that has the older metal oil filter cap and doesn't accept the power steering pumps above, then you may have to either order our adapter plates and do some custom work on the bracket, or swap them with the M52/M54 oil filter housing. Remanufactured parts work fine for the price but some are one mm or two inaccurate which is something easily resolved. Yards and second hand are an alternate as well. For E30's look at the guides, specialty build section.

IAT Sensor (optional)

If you haven't changed your intake manifold, e.g. M50 manifold on M52 engine, then it's not required.

Should you be using the M50 manifold on your M52/US S50/US S52 motor, then you will need to use the OBD2 IAT (intake air temp) sensor, found on the M52 manifold.

People often put it in the piping, close to the throttle body where the green O ring is taken out. The sensor is jammed into a little drilled hole in the rubber elbow that has the ICV inlet hose and connects to the MAF. However, when boosting, I would recommend you take out the existing sensor in the M50 manifold and then use your M52 sensor. Shave some plastic off the extra push clip bit, and then begin to use the 'Tap and Die' to make some threads into the sensors plastic area above and below the green O-ring itself, so it fits right in place of the existing M50 IAT sensor's threaded hole.

Once satisfied, use some silicone before screwing it in**.** But, as said earlier, unless you are using a M50 manifold on a M52/M54 engine, there is no need to bother here.

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Parts and Accessories

We provide the entire kit, manifold pipework and mounting hardware; however, there are still some parts, such as the silicone hoses and couplers that you will have to buy on your own to pipe the SC to the motor, along with minor fittings and smaller hoses. Here will be a list of parts you will need for the installation. Bolts are supplied with the kits, but for more information, please refer to the separate bolt guide.

Belt (Included)

The right sized belt to get the setup started is provided in the kit. Other sizes can also be ordered from us or from your nearest automotive store. The size of the belt depends on your pulley size and belt orientation.

NOTE: Please refer to the appendix for the 2 different types of belt orientation for both brackets.

V1 Belt Orientation

(No secondary wrap pulley between the alternator and the supercharger)

Pulley Size	Belt Size
113mm Pulley (Stock)	6PK2260
103mm Pulley	6PK2250
93mm Pulley	6PK2240
HMW 80mm Pulley	6PK2230
65mm Pulley	6PK2210/2215

When you change pulleys, you will need to get shorter belts. Go anywhere between 10-15mm longer or shorter for every pulley that is 10mm smaller.

V2 Belt Orientation

(Secondary wrap pulley is added to between the alternator and the supercharger, for both designs)

Pulley Size	Belt Size
113mm Pulley (Stock)	6PK2310
103mm Pulley	6PK2300
93mm Pulley	6PK2290
HMW 80mm Pulley	6PK2280
65mm Pulley	6PK2260

In both cases, the incorporation of the V2 belt wrap pulley near the supercharger causes the belt sizes to increase by an estimate 50mm.

Note: different belt manufacturers may have belts that slightly vary in length. Therefore, use the above belt charts as a guide to determine closest to what you will need.

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Idler Pulley (Included)

We provide a BMW idler pulley with the kit. This is to apply more tension and wrap to the belt. It simply bolts onto the brackets as depicted on the pictures. These pulleys are available at either auto part suppliers or wreckers. Remember: it's the straight bolt through and not the offset pulley.

BMW Part number 11281748131.

You will need 2 of these, if you want to use the newer V2 belt orientation.

Radiator, Upper and Lower Hose
(Included – Needs Some Modification)

Since 2019, we have a custom top radiator hose adapter that can be used to modify your existing factory or aftermarket radiator hose.

As seen below, using an extra upper radiator coolant hose and cutting it close to the bend, then turning the longer piece upside down, gives you the correct angle.

Notes on Top Hose: On the E30 with a 6 cylinder you can use a M50 top radiator hose and a 318ti radiator. On the E46 some people have found the R33 skyline radiator hose to work well for the top radiator hose.

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M54 Bottom Coolant Reservoir Hose: On certain E38/E39 or Z3/Z4 builds you will have to modify the bottom radiator coolant reservoir hose as well and discard the plastic joiner, in order to get clearance.

Pictures Courtesy of Mattias Andersson of Sweden

Main Accessories

- **1x POD Filter of Choice**
  2.5" or 63-65mm OD and no more than 6"in length, this filter can go behind the bumper under the lights.
- **1x 25mm breather filter or Oil Catch Can with filter**
- **1x 16" or larger Electrical Fan** (to replace the mechanical fan in the car)
  (To wire this: Turn it on using a relay that closes with, when the fuel pump relay is closed; comes on when fuel pump is on aka when car is running)
- **1x Boost Gauge** (digital or analogue, from a reputable brand)
- **1x Wideband AFR O2 System**
  (For tuning, having a wideband o2 sensor to read your air fuel mixture would be critical, e.g. Innovative, AEM have a good system, among others)
- **6x Larger Injectors, either #30, #36 or #42 lbs.** For setups around 5 - 10PSI, although the pink top M52 injectors are rated 21 lbs. and shown to work well under 5PSI.

Other Parts

- **Automotive Electrical Wire** - To solder and extend the MAF, IAT, charcoal canister connectors. Also need to connect the supercharger's clutch to a ground and power source (if using stock pulley). We typically suggest 5 meters of 20-22-gauge wiring.
- **Zip Ties** (use them for the smaller vacuum lines).
- **Epoxy and Gasket Maker:** Some 2-part epoxy, such as JB Weld, helps if you decide to drill your factory intake manifold and add any barbs to it for the boost gauge etc. It can also be used to make the ICV on M50 manifold boost-proof. Also, some black high Temp RTV silicone gasket maker or cork gasket paper - to make the manifolds to the SC14.

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Tools: To install this kit you are expected to have basic mechanical tools and experience. Example of tools you will use would be: complete socket sets with extensions, screw drivers, soldering iron and electrical hobbyist basics for your wiring. A BMW fan removal tool, (a thick screw driver can also lock the water pump nuts and undo the fan with a 32mm spanner, clock wise will remove it). Floor jack and stands can also help.

Silicone Hoses and Couplers

All can be found in your nearest automotive stores or online. It's best to use thick walled 3 – 4Ply silicone hoses so they don't collapse, and good quality as in fuel/nitrate/oil rated. It's also recommended to use good quality worm type clamps throughout. T bolt type clamps can leak if improperly installed.

- 2x reducers 79mm to 64mm ID joiner (for connecting the MAF)
- 2x 63mm 90-degree sharp bend joiner (for piping the throttle body or dummy TB to SC14 outlet)
- 2x 63mm straight joiner
- 1x 63mm 45 degree (for piping SC14 discharge to manifold)
- 1x 25mm straight (1.2m in length)
- 1x 22mm 180-degree bend silicone elbow (to connect ICV to M50 manifold - not required for M52 or M54 manifold)
- 1x 4mm vac hose (length 4m)
- 1.5 meter of 10mm hose (for EVAP charcoal canister, dipstick tubing)

Note: Do not use silicone hoses longer than 65mm or 3" (inches). The aluminum/metal tubes are for covering longer plumbing while the silicone hoses merely serve as a connector or joiner between two aluminum/metal tubes. Prolonged Silicon hoses typically will collapse under vacuum and cause airflow restrictions.

Clamps:

- 10x worm hose clamps for 2.5" couplers
- 10x smaller worm hose clamps for all the small stuff, 12 – 30mm

Pipes:

(Metal pipes are all 2.5" outer diameter/O.D.)

- 1x 90-degree bend pipe, 4" each side 64mm OD or 2.5"
- 1x straight pipe, 5" length - 64mm OD or 2.5"
- 2x straight pipe 60mm length - 25mm OD

Hose Joiners:

- 2x 25mm hose tail/joiners (for ICV to SC TB relocation intake)
- 4x 1/4" and 4x 1" joiners

NOTE: Use steel or brass joiners only! Plastic will melt or deform.

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Installation

Things to Remove

Begin by taking all safety precautions. This page will cover the basics. There is nothing too complicated involved. However, if at any time you have doubts or questions, simply email us or just search for it online and you will find many DIY guides in the internet forums and on YouTube. Also, keep all bolts and screws in containers, take pictures and label them if necessary, so that you don't lose anything. Start off by removing the following below.

Intake Piping - From the throttle body. They are connected using hose clamps.

Stock Airbox and MAF Sensor – Airbox is usually held on by two bolts and some clips. Also, put the MAF sensor in a secure place, spray it with some electronic parts-cleaner as well, while it's out and remember its orientation, when reinstalling. The arrow points towards the engine.

The Bumper – Remove the bumper trims. You will have 4x 13 mm nuts. Look under the front wheel wells and you will see a screw on each side that holds the bumper, while assuming your wheel well plastics are still in one piece. Double check for any other screws or bolts underneath. You should be able to simply slide the bumper off, but be careful as you have to disconnect the 2 fog light connectors as well as the 2 temp sensors on each air duct, so it helps to have the car jacked up now.

Top Radiator Hose (optional) – Once the car has sat and cooled down, you can remove the top/hot hose. Prepare for some spillage and mop as needed. **Be sure to refill and bleed the cooling system,** once you are done installing the radiator back at the final stages. If you don't bleed properly, you will leave many air pockets which will end up causing your engine to overheat. Use the correct type coolant when refilling. Distilled water can work well for testing purposes but not long-term storage without additives.

Engine Lift Top Bracket – You will need to remove the Vanos/engine top head bolt, as well as the thermostat bolt underneath. Don't forget to put the thermostat bolt back in and tight it properly to spec, or else it will leak!

Power Steering Reservoir – It's held by 2 bolts on to the engine mount or the oil filter (depending on the model of car and engine). Relocate it. On some models, your engine lift arm has spot to bolt it on from the factory.

Power Steering Pump Pulley – There are 3 bolts holding it in place. It helps if you can lock it or have someone give you a hand while you undo them. Be careful not to break it. There are metal pulleys available for the power steering pump.

AC and Serpentine Belt – Take out the power steering pulley bolts, before you remove the belt. First remove the power steering belt and then the AC one. It uses a hydraulic tensioner with a locking mechanism, where you can use a locking pin or an Allen key to jam it. There are some good guides online how to remove both belts.

Power Steering Pump and Bracket – This is the final part. There are five bolts in total and this is what our main front bracket will replace. Keep track of the bolts, sizes vary. Once it's out, use

cable/zip ties to secure the pump, so that all the weight or pressure is not on the hoses. Now may also be a good time to replace any leaky hoses!

ICV and Crank Case Setup

Basically, the ICV is directly connected to the manifold, using either a single piece of 180-degree silicone pipe around 22mm ID or using multiple brass joiners, then left secure in its original mounting place.

Its recommended to use epoxy such as JB Weld on the area that clips into the manifold, as it will see a lot of heat and boost pressure will cause it to pop out. Hence, JB weld is commonly used in this case by a lot of people who use forced induction setups on these engines' cars with this particular manifold. The picture below should be quite self-explanatory.

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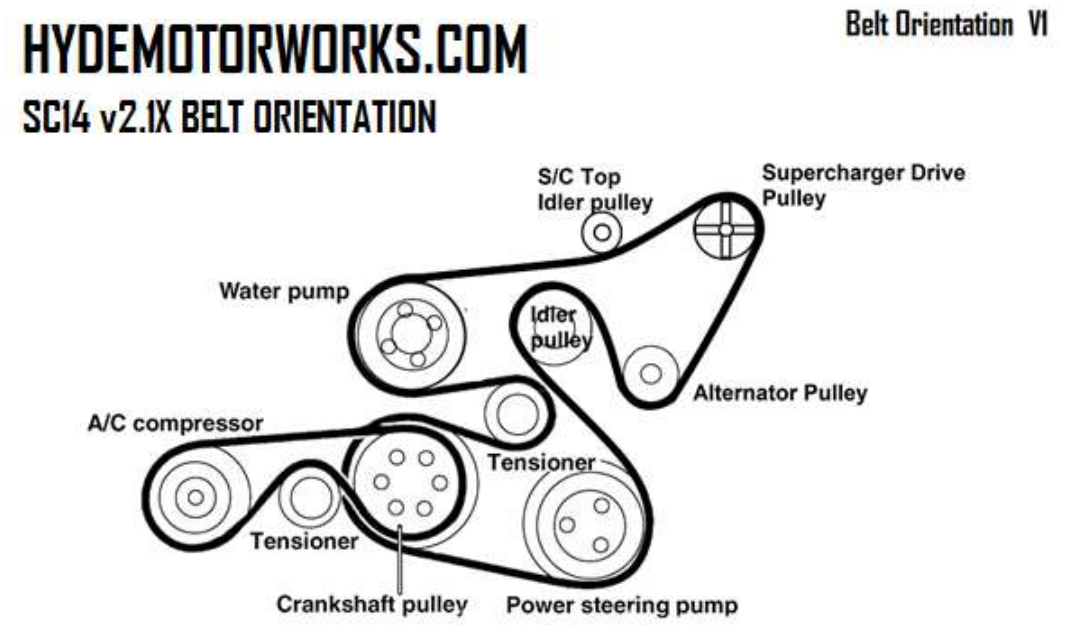
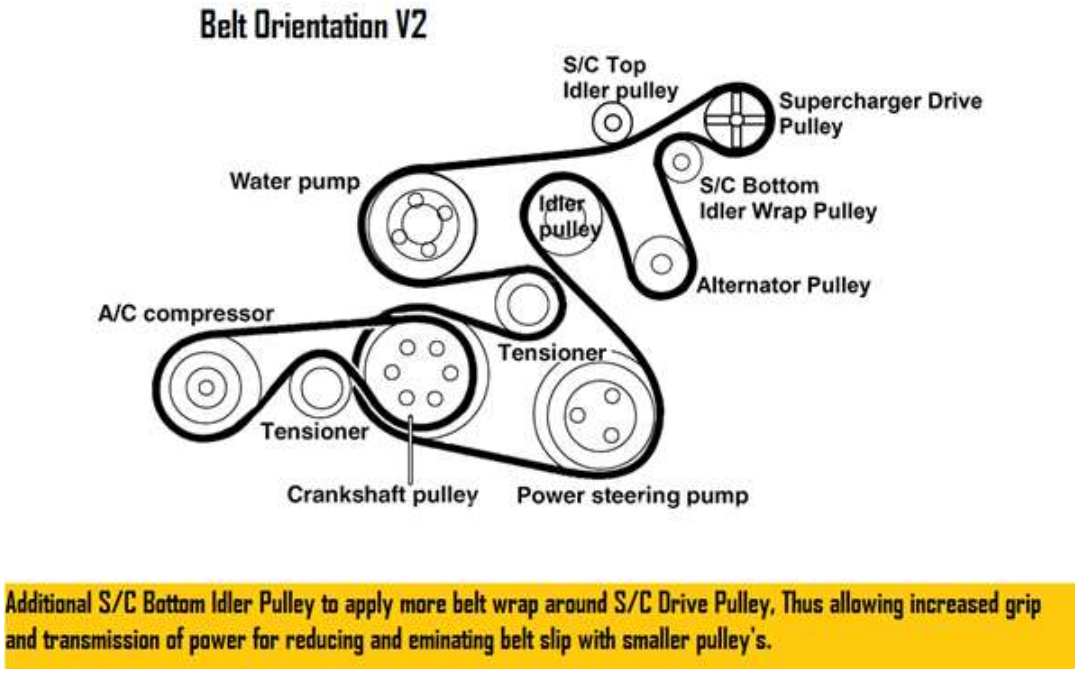
Drive Belt Orientation

Below are the 2 possible drive belt orientations. The first is the one originally recommended. We do provide a second pulley for those who may want to use it to decrease the chance of slow and gradual slippage in higher RPM's on track usage. The V2 design addresses this by incorporating an additional bottom pulley to apply more wrap and tension; it's a separate small modular bolt on piece to the original system but requires a larger belt. Refer to the belts section above.





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V2.1 Brackets

The most recent versions are V2.1 Extended Rev 3, which simplifies from all previous versions. The brackets come in 3 main pieces: The main bracket itself (FIG 1), the side support triangular bracket (FIG2) and the top support bracket (FIG 3). The setup also uses now some 5mm and 10mm thick spacers to space out the pulleys and top support bracket.

Main Bracket

The main bracket plate replaces the power steering pump bracket in all BMW M5X/S5X line of motors. It's made from **10mm thick mild steel.** Secondly, all 5 power steering bolts are upgraded to bolts 5mm longer, to reflect the space in between.

Note: 5mm is the absolute minimum this bracket should be made out of and may cause bracket flex in racing conditions. For example, every single mm someone choses to decrease from recommended thickness, top spacer mount plate will increase by a single mm, and secondly the bolts will decrease by a mm.

Side Support Triangle Plate

This under plate serves to fill in the some 5mm gap left between the main bracket and the **mechanical tensioner bolt hole,** and thus **bolts behind** the main bracket by using some 6x M6 bolts, either Hex head or Allen head. The tensioner bolt should be upgraded to a 5mm longer bolt, to reflect the add-on 5mm extra in space.

Tolerances can be very loose at about -/+ 1-2mm; this part is made out of **5mm** thick steel to allow full movement of the mechanical belt tensioner.

NOTE: M54/S54 and hydraulic tensioner users may not be able to use this bracket and must replace it with a mechanical tensioner.

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Circular Spacer

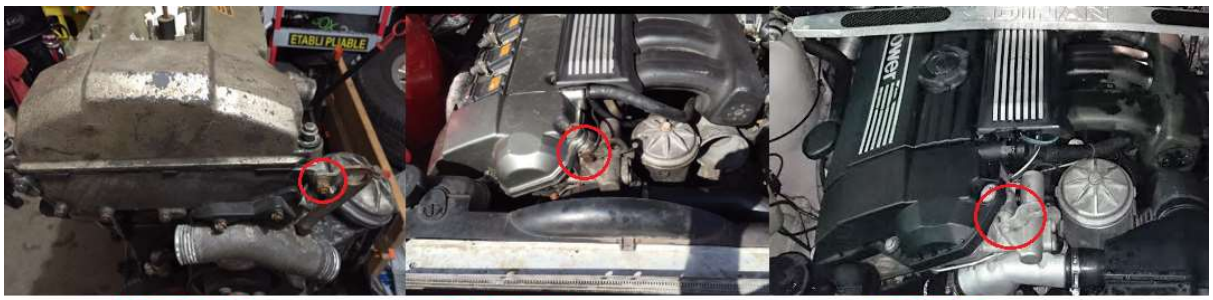
These are circular spacers that are stalked up for the streamlined look when used as stand-offs for the pulleys (4x 5mm high circles), as well as spacers for the top bracket (2x 10mm high spacers).

Also NOTE: We recommend to use BMW idler pulley (provided) that is straight bolt through, and not offset. BMW part number 11281748131.

Top Support Brackets

The top support bracket bolts directly to the vanos/engine lift bolt and is the recommended bracket for all M50TU/M52/M52TU/M54/S52US.

2x 10mm high circular spacers are required between this bracket and the top of the main support bracket for those motors above.



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SC14 Manifolds and Pipework

We provide our own powder coated manifolds, professionally welded and powder coated. Left to right: #1 is the SC14 discharge outlet, #2 and #3 are dummy throttle body pieces, for those wishing to relocate their throttle body before the supercharger, and on the far right #4 is the SC14 inlet.

Note Manifold #2 and #3 are multi bolt patterned and #2 has a curved cut to add support for the M50/M52 and M54 throttle body. The bolt holes are kept smaller for your convenience and will require slight drilling to enlarge, depending on the engine manifold or should you wish to tap them.

Installation Steps

The basics, of course, were covered earlier. A quick rundown would be the following:

Part 1

1. Remove the top radiator hose. Make sure, the engine is cool and be ready to mop up any spillage.
2. Remove the engine mechanical fan.
3. Remove the AC belt and then the serpentine belt.
4. Remove the 3 bolts on the power steering pulley, now remove the pulley itself to get to the power steering pump bolts.
5. There are 5 bolts altogether in the power steering pump assembly. 3 of them are holding the power steering pump to the pump's bracket. The 2 other bolts, that are on top, attach the factory power steering bracket to the alternator housing and engine block.
6. Once this is done, you can remove the plate itself, that holds the pump.
7. Next, remove the alternator offset idler pulley bolt.
(If your car has the pulley, just leave it lose all the way, no need to take it all out)
8. Remove the belt tensioner top bolt. (The belt tensioner is held on by 2 bolts, 1x top and 1x bottom)

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Part 2

9. Now prepare the V2 main bracket by bolting the side support bracket to it, using the 6 bolts.
10. You can now either leave the SC14 inside the empty space or slide it in, after bolting on the bracket.
11. Slide the V2 bracket, sit it properly and bolt it. Install the power steering pump assembly back.
12. Bolt the side support bracket, that extends to the tensioner bolt mount.
13. Now undo the engine hook for bolting on the top support bracket.

Part 3

14. Now bolt on the supercharger itself.

Assuming you have done all the pipe work, as shown in the chapter below on building the SC manifolds. If not, now is a good idea to resolve them and when bolting the manifolds back, use proper gasket maker and ensure it's not leaking, you will need to hold it up right with your right hand from underneath, till the long bolts slide in.

15. Install the idler pulleys, using the standoffs in the pre-determined spots on the bracket.
16. Install the top support bracket using the spacers and top bolts to the adapter plate.
17. Finally, remove your bumper and do the intake piping and MAF installation.
18. Reinstall the power steering pulley, correct the belt (according to pulley and number of wrap idlers used, any remaining bolts such as water pump /thermostat housing, that's required to be removed for the removal of the engine hook. You may have found that adding the mechanical fan has become impossible. This is why we initially suggested adding an electric fan. Put your radiator hoses back, tighten the hose clamps, now refill and bleed the system properly before usage. It's important to properly bleed these engines out of air pockets in the cooling system).

Now you can work on the rest of your piping and vice versa.

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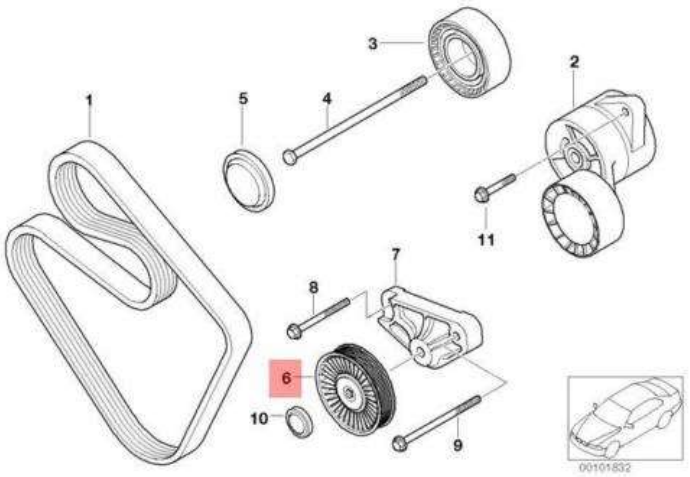
Specialty Builds and Adapters

V2.2 Z Car – For BMW Z4 / Z3 (3L M54B30)

Installation on the Z4 is slightly different, as it requires a different bracket. This is mainly due to the Z4 having an electric power steering pump setup unlike the more traditional M54's, that has the traditional hydraulic power steering pump run by the belt.



On the Z4, you will find a bracket, like the one in the picture to the left, that bolts on to the 2 bottom holes of the oil filter housing and onto this bracket there is a free spinning deflector pulley.

Therefore, simply remove this whole assembly by undoing the 2 bolts (#8 and #9), that hold the deflector pulley bracket mechanism in place.

Next, use the 5mm thick adapter spacer bracket shown below and place it behind the bracket. Run the two bolts through it and install the bracket. **Note:** use a 10mm circular spacer behind the OEM deflector pulley, before mounting it on one of the two holes provided.



You will find now that there is an identical 5mm spacer to the one above. This goes on the other side, behind the oil filter housing and under the alternator, where the bolts come through. Simply place it there and use the provided nuts and washers and tighten it to spec.

At this stage you may want to fasten the side triangle bracket and test fit the supercharger to double-check if it's all sitting straight in line with the rest of the pullies and ribs. Should this not be the case, you may need to space it in or out more, with the spacers of 5mm increments. On the top support bracket, you may also need 3x 10mm spacers instead of two. Rest of the installation should be the same.

Credits for the V2.2 Z R&D and guide goes to David Eckersley of Manchester, England.

E30 with 6 Cylinder M50/M52/M54 Conversion

The V2.1X is tried and tested on the E30 with M5x motors. Installation is the same with the exception that you must ensure, you are using the M52 or M52TU oil filter housing. The oil filter housing in the M54 may interfere a bit with the E30 chassis, just enough to throw off the bracket and cause clearance issues with the hood. Therefore, please use the M52 or M52TU oil filter housing if you are running a E30 BMW chassis with any M5X based 6-cylinder motor.

M54 Engine Spacer Brackets Kit

For those with the M54, we supply a 2-piece 5mm thick spacer bracket that can be used if you are having clearance and difficulty with piping. This will shift the blower some 30mm to the right and clear the manifold slightly. Although there are many ways to install it as shown in the picture where its installed further away, we suggest the bracket be installed closer and right on top of the main mounting bracket. Then use 1x 10mm or 2x 5mm spacers in between the hole that bolts on the SC14. **This M54 shift bracket & spacer kit is included with all V2.1X kits ordered since September 2019.**

Credit for M54 spacer bracket goes to Alexandre Astier of France.

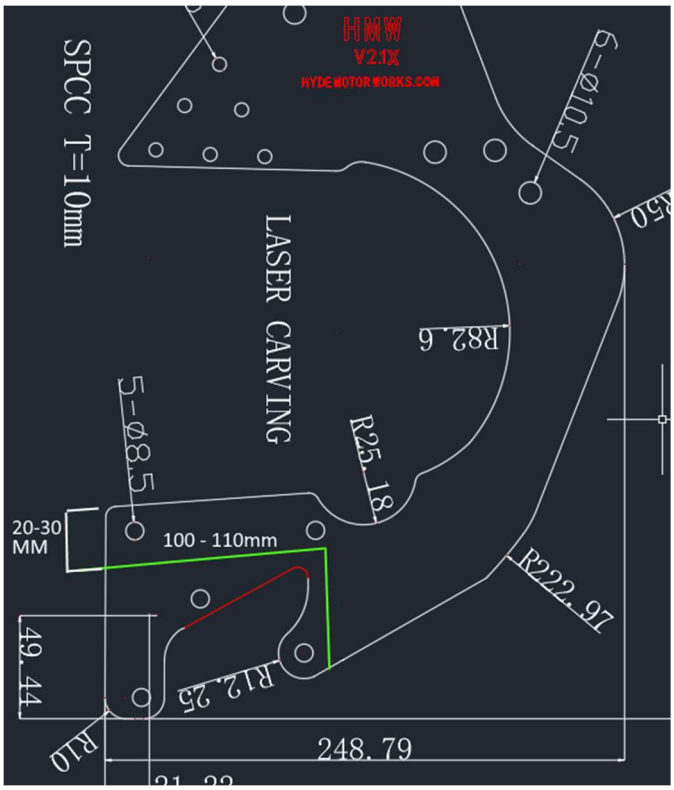
Alternative SC14 Bracket Adapter

There are 2 versions of the SC14: the commonly used ones for our kits is what we refer to as the Type 1 - Yellow dipstick, cross face pulley verity, that comes from the Toyota Previa. In many cases, they come from the Toyota Crown and Supra. This is the Type 2. If you happen to have the alternate Type 2 SC14, which has a longer bottom leg, then you must use the alternate SC14 adapter bracket. This bolts on to the bottom portion of the existing V2.1X bracket and allows you to mount the Type 2. On the picture below we show a weld on version. But in the kits, we offer a bolt on version. You must use a 10mm Spacer or 2x 5mm Spacers between the Alternative SC14 bracket and the SC14 supercharger itself.

Credit for Type 2 alternate SC14 bracket R&D and guide goes to Lukáš Komzák of SMK Auto in The Czech Republic.

This Type 2 alternate SC14 adapter kit is included with all V2.1X V V2.2 Z kits ordered since September 2019.

Stock M50 Power Steering Pump Bracket



This is an unofficial modification we are including here for those on a budged and still want to retain the stock M50/S50 power steering pump. This modification can affect the structural integrity of the bracket system and is not recommended and will void any warranties of the kit. This requires the bracket to be cut at the green line, shown in the image here. Suggested height at where it should be cut is around maximum 20mm in height and can be taken up to 30mm minimum; and the length to be 100 -110mm long. This will be dependent on the M50 power steering bracket itself. Cutting areas of the existing power steering pump bracket to gain clearance will be required. Alternatively, ordering the HMW M50 power steering pump bracket which is flat, is also an option. Pictures below should give a rough idea.

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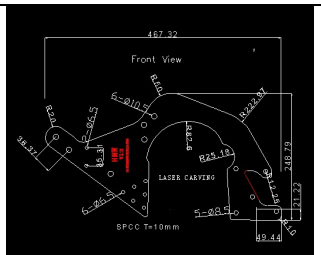
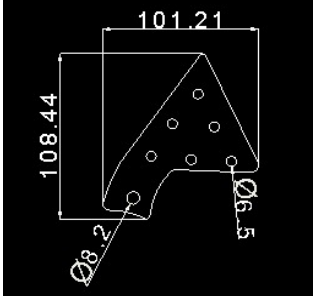
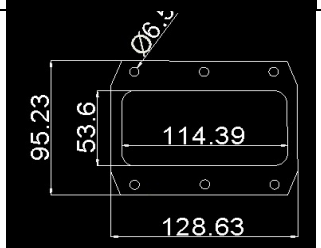
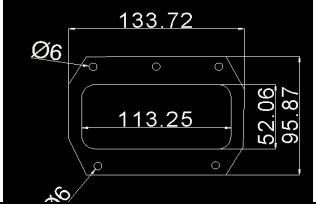
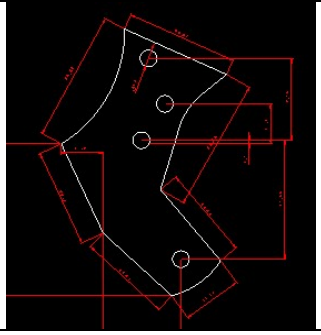
Bracket Quantities

V2.1X Main Brackets

Part #	Name and Quantity	Picture	NOTE
1.	Main Bracket 1x Per Set		This is the main bracket that bolts on to the power steering pump and allows the SC14 to be mounted.
2.	Side Support Triangle 1x Per Set		This 5mm piece sits BEHIND the main bracket and bolts to the tensioner bolt.
3.	Top Support Bracket 1x Per Set		Sits on front of the main bracket side and attached to the engine lift/vanos bolt.
4	SC14 Outlet Frame 1x Per Set		This acts as a spacer between the SC14 outlet and outlet manifold, and makes up for the studs' length.
5	SC14 Inlet Frame 1x Per Set		This acts as a spacer between the SC14 inlet and inlet manifold, and makes up for the studs' length.
6	Type 2 SC14 Adapter 1x Per Set		This is an alternate SC14 (Type 2 from 1G) engines that have the bottom mounting further away from the usual location. Sits on top of the main bracket. Use only, if using a Type 2 SC14.

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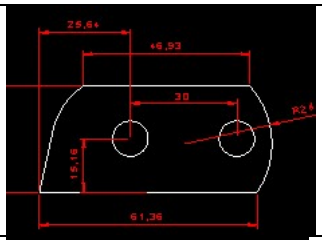
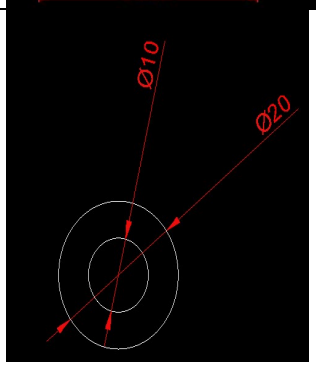
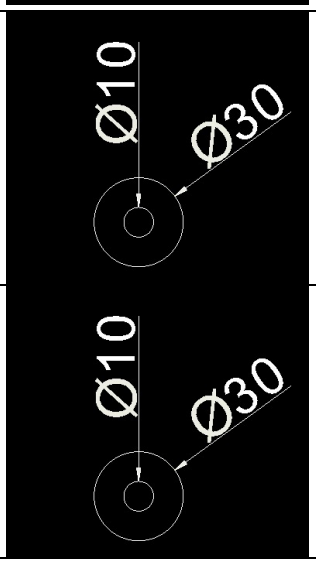
Part #	Name	Picture	NOTE
7	M54 V2.1x Shift Bracket 1x Per Set		For the M54's needing an extra gap between the SC14 and the engine manifold, this can be used to shift the SC14 about 30mm away.
8	5mm or 10mm Thick Alternate Spacers 4x 5mm Per Set **If Not If Not Available = Exchange With Below** 2x 10mm Thick Spacers		These spacers go between the M54 Adapter Bracket & the Type 2 SC14 Bracket and the Supercharger itself. M54 Shift Bracket needs either 1x 10mm or 2x 5mm (Total 10mm). Alternative SC14 Bracket needs either 1x 10mm or 2x 5mm (Total 10mm).
9	5mm Thick Spacers (8x Per Set) **If Not Available = Exchange With Below** **4x 10mm Thick Spacers**		These are regular interchangeable (part #9 &part #10) washers used to space the pullies & the top support bracket.
10	10mm Thick Spacers (2x Per Set) **If Not Available = Exchange With Below** **8x 5mm Thick Spacers**		These are regular interchangeable (part #9 &part #10) washers used to space the pullies & the top support bracket.

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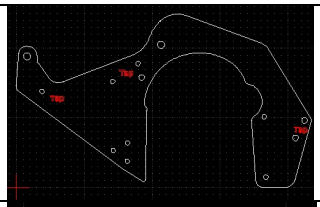
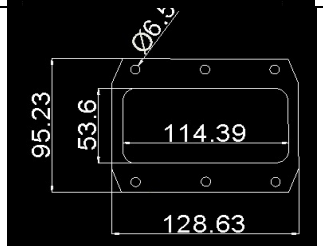
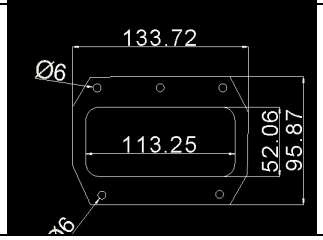
V2.2-Z4/Z3 Main Brackets

Part #	Name and Quantity	Picture	NOTE
1.	Main Bracket 1x Per Set		This is the main bracket that bolts on to the power steering pump and allows the SC14 to be mounted.
2.	Side Support Triangle 1x Per Set		This 5mm piece sits BEHIND the main bracket and bolts to the tensioner bolt.
3.	Top Support Bracket 1x Per Set		Sits on front of the main bracket side and attached to the engine lift/Vanos bolt.
4	Bottom Bracket Spacer 1x Per Set		Thickness: 5mm
5	SC14 Outlet Frame 1x Per Set		This acts as a spacer between the SC14 outlet and outlet manifold, and makes up for the studs' length.
6	SC14 Inlet Frame 1x Per Set		This acts as a spacer between the SC14 inlet and inlet manifold, and makes up for the studs' length.

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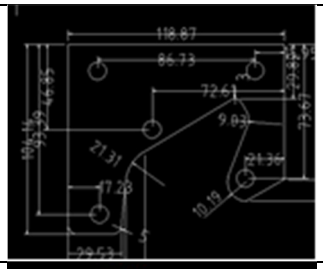
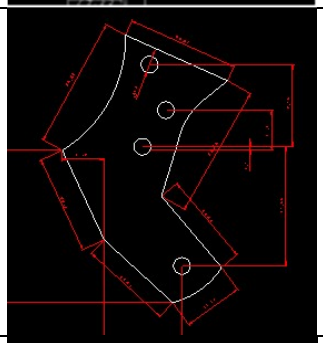
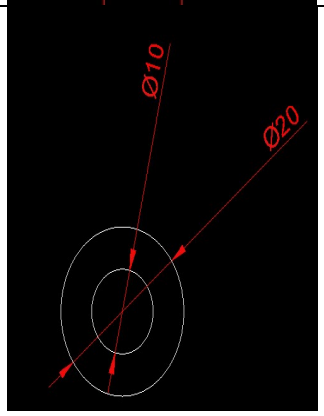
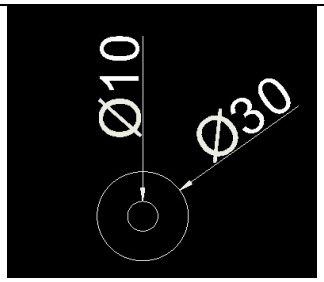
Part #	Name	Picture	NOTE
7	M52/M54 Power Steering Bracket 1x Per Set (For Z3's)		Thickness: 5mm
8	Alternate Type 2 / 1GZ SC14 Adapter 1x Per Set		This is an alternate SC14 (Type 2 from 1G) engines that have the bottom mounting further away from the usual location. Sits on top of the main bracket. Use only, if using a Type 2 SC14.
9	5mm or 10mm Thick Alternate Spacers 8x 5mm Per Set **If Not Available = Exchange With Below** 4x 10mm Thick Spacers		Alternative SC14 Bracket needs either 1x 10mm or 2x 5mm (Total 10mm). 6x for Z3 PS 3 bolts shift back 10mm.
10	10mm Thick Spacers (9x Per Set) **If Not Available = Exchange With Below** 18x 5mm Thick Spacers		These are regular interchangeable (part #9 &part #10) washers used to space the pullies & the top support bracket.

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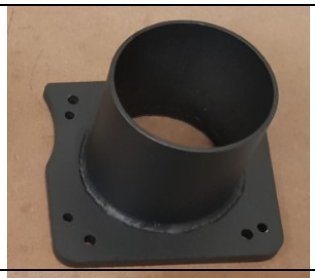
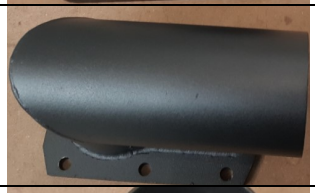
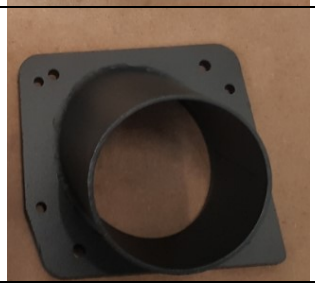
Manifolds

M5X Throttle Body Relocation Kit = Manifold 1 + Manifold 4 Together**.**

SC14 Manifolds Kit = Manifold #2 + Manifold #3 Together.

V2 & V2.2 Complete Manifold Kit = All 4 Manifolds Below Together.

Part #	Name	Picture	NOTE
1.	**Manifold 1** (Throttle Body Relocation) **1x Per Set** **Throttle Body Relocation Kit Part 2**		Those looking to relocate the throttle body, need to use this manifold in place of the stock one. This part is different as it has a curved notch cut on to its side, so that it fits the M54 engine manifold better. (Not interchangeable with Manifold Part #4)
2.	**Manifold 2** (SC14 Outlet) **1x Per Set** SC14 Manifold Part 1		This is the SC14 Outlet Manifold, Has 5 Bolt holes, to be used in conjunction with Part #4 SC14 Outlet Frame of the Brackets Kit.
3.	**Manifold 3** (SC14 Inlet) 1x Per Set SC14 Manifold Part 2		This is the SC14 Inlet Manifold, has 5 Bolt holes, to be used in conjunction with Part #5 SC14 Inlet Frame of the Brackets Kit.
4	**Manifold 4** (Throttle Body Manifold Dummy) 1x Per Set **Throttle Body Relocation Kit Part 2**		Those looking to relocate the throttle body, need to use this manifold in to bolt on the stock manifold on to as to allow it to be easily useable. (Not interchangeable with Manifold Part #1)

HMW V2 Installation Guide

Nuts and Bolts Guide

The V2.1 kit includes a set of nuts and bolts, to make the installation experience much more convenient. Here is the chart to quickly identify the main bolts and description of where they are installed, along with an image for reference:

#	Bolt Size	Included	Bolt Purpose
1	M10 x 80	**1x** Bolt, Nut and Washer	This is the SC top mount bolt, goes through the top mount bracket, through the top bracket adapter plate and then through the main bracket, and finally bolts on the SC14's top bolt hole.
2	M10 x 50	**3x** Bolts, Nuts and Washers	One of these goes on to mount the bottom bolt hole of the SC through the main bracket. The other can be used to mount the top bracket adapter plate's 2nd hole. The last can be used to mount the tensioner pulley and the 22mm pulley spacer.
3	M8 x 40	**2x** Bolts	One can be used for the top bracket, fastening to engine cylinder head (Vanos/engine lift point on M50/M52/M54). The other one is to be used to replace the top bolt on the drive belt tensioner.
4	M8 x 25	**3x** Bolts	Replaces the 3x bolts used to mount the power steering pump itself.
5	M6 x 25	**5x** Bolts, Nuts and Washers	To attach the side mount bracket, which bolts on to the tensioner pulley top bolt.

In addition, there will be other nuts and bolts included for parts as the manifolds and throttle body relocation kit. Kindly contact us should you have questions.

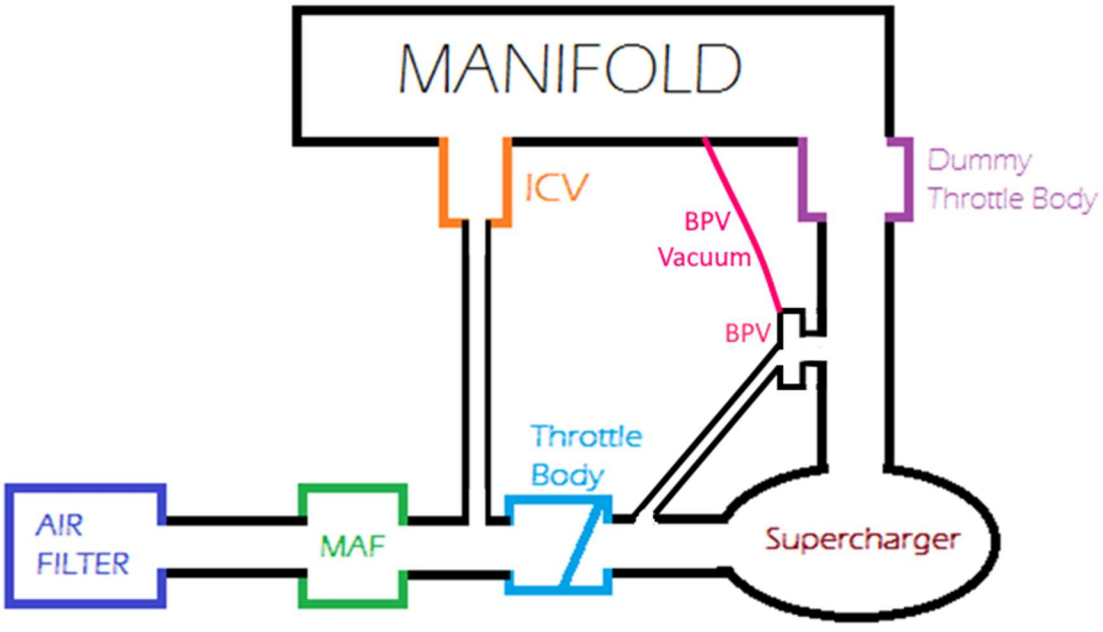
HMW V2 Installation Guide

Bypass Valve & Suggested Setups

Use only a Bypass Valve (BPV). A Blow Off Valve (BOV) in this system will be a major controlled boost leak.

A car that uses a MAF system calculates any air, that flows past the MAF and uses that amount to work out fuel and spark and any required enrichments, as per the map. If you put a blow off valve that's blowing off the boost, then you will not only lose boost but the car will add fuel/spark/timing for the air, that's no longer present, thus run poorly. It will be akin to buying a balloon, making a hole in it and wondering why it won't hold pressure.

That said, <u>you *can* use a By Pass Valve (BPV)</u> that opens only on high vacuum (idle or foot off gas). But again, even a BPV is not required if you put the throttle body before the SC. Also, you must note, the ICV is connected after the MAF and before the throttle body. Use thick walled silicone hose for that and on sharp bends, in larger 2.5" hoses, use metal couplers in conjunction with silicone, to avoid hoses from collapsing under high vacuum. The engine breather is better off being vented to atmosphere or through a catch can.



Suggested Supercharger Setup
(Basic Non Intercooled)
HYDEMOTORWORKS.COM

For more suggested setups, kindly refer to the HMW Intercooler and Non-Intercooler setup piping guides.

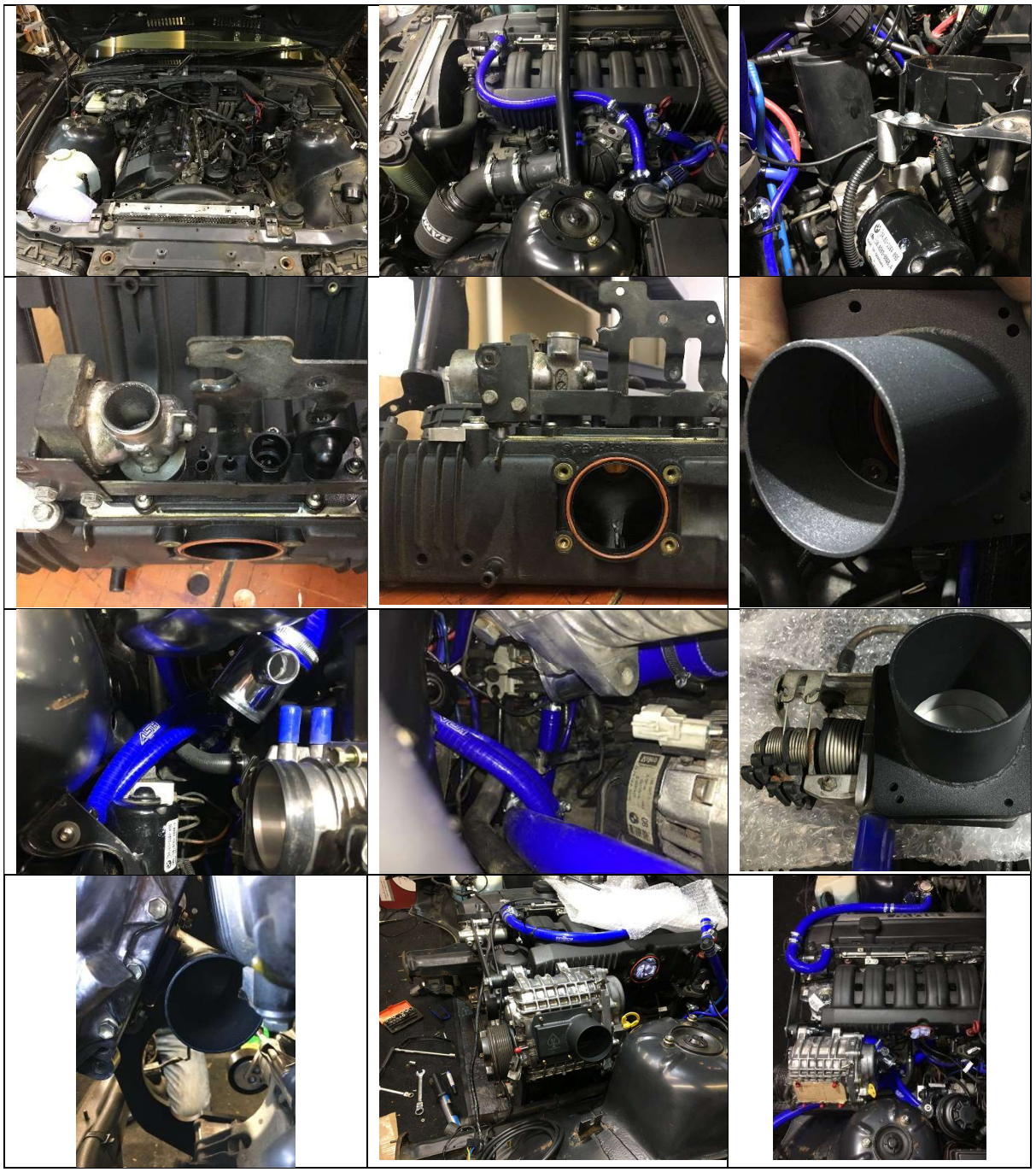
Some installation pictures are covered on the next pages, to give you a better idea. For more pictures of builds please look at our website's gallery or contact us.

HMW V2 Installation Guide

V2.1X Installation Pictures

HMW V2 Installation Guide

Installation Pictures #2

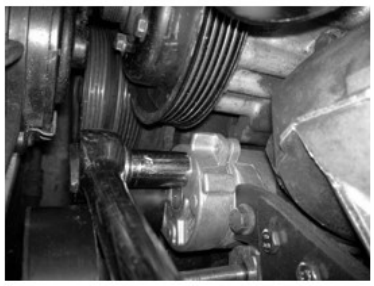


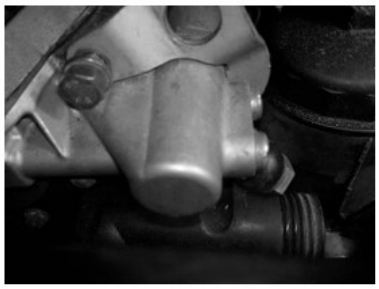
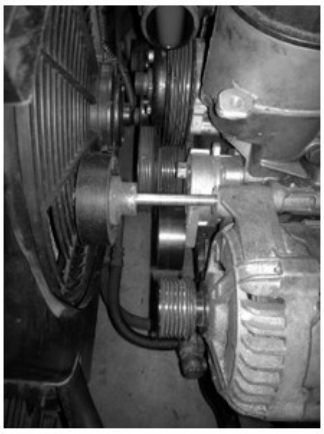
Installation Pictures on this page and above are Courtesy of John Truman of Pulse Tech, UK.

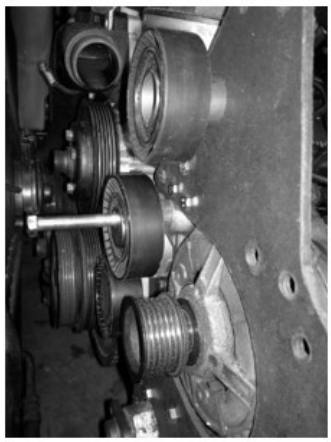
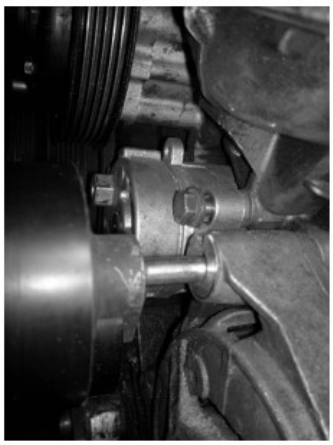
HMW V2 Installation Guide

Installation Pictures #3



This concludes the installation of the HMW V2 Supercharger Kit. For any further questions, support and information, please contact us directly via phone or email us at HYDE@HYDEMOTORWORKS.COM or KEITH@HYDEMOTORWORKS.COM.
We hope you enjoy your new supercharged BMW and wish you happy and safe motoring!