

The Original Roots Supercharger Project for BMW's

# HMW M1 K.C. SUPERCHARGER KIT INSTALLATION GUIDE



The HMW M1 is at its time of conception the largest commercial roots supercharger kit ever developed for a BMW. This is our top of the line system meant for the M5x & S5x line of BMW engines and based upon support for many large superchargers such as the Eaton M122H, Eaton TVS2350 found on the GT500, as well as with minor customization support for the Whipple 2.3L, 2.9 and Kenne Bell 2.8 superchargers.

With a power output range of 500-700HP and starting with a base boost pressure of 14PSI, and capable of flowing up to 25-30 PSI while still using a traditional air to air intercooler. The HMW M1 is a behemoth that delivers years of research & development in an affordable easy to install package, giving the user unmatched power and acceleration.

Originally showcased in the 2017 Bimmerfest East and now used by our team competing in the 2020 American Endurance Races, the M1 was intended for reliable applications in race engines built for endurance & high performance. For an otherwise stock street engine, the setup can also be restricted to 9-10 PSI. The supercharger system retains all OEM accessories as air-conditioning, power steering, alternator and even utilizes the OEM belt drive & OBD functions of the car.

Each kit is individually tested before shipment & is covered by a 3-year craftmanship guaranty on all HMW manufactured parts.

This guide should cover the installation as a whole and we offer our extended customer service to all clients through email or phone. The user is strongly recommended to have a custom dyno tune utilizing either their stock ECU or an aftermarket Piggyback or Standalone ECU so the system can perform at its optimal range of power.

**Disclaimer:** If you intend to use or install this setup please use all safety precautions & check with your local laws and regulations. We take no liability for unforeseen issues such as but not limited to the damage of your or anyone else's health and property or unlawful acts committed from application, usage or production of our products in both private or public domain. We make clear that the name HMW M1 kit to be an acronym of the HMW M122H K.C. and is not to be mistaken for the BMW M1 series of cars; we are not affiliated with BMW, Eaton, Whipple, Kenne Bell or any other name or brand. All mentioned products & logos are registered trademarks & property of their official owners. In addition to the aforementioned disclaimer, by using any Hyde Motor Works parts and services or knowledge gained through reading this guide, you also agree to our terms of use and policies which can be found on our website.

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#### What is included in the M1 Kit?



Below is a list of parts to give the user a basic idea and understanding of what main components are included in an HMW M1 KC type kit. Please note, there are smaller parts such as the throttle body relocation kit or the drive belt which are not shown or mentioned, along with improvements we make throughout every revision of the kit and extra parts that may be included. Kindly note, the supercharger (11) is only included in orders that request the supercharger also called *"Full M1 Kits"*, while Intercooler parts (13, 14, 15) are included in the *"+ Intercooled Kits"*.

Part #	Name & Description	Included with
1	M1 KC Discharge Pan – Bolts the Supercharger (12), attaches to part 4, 6 & 7	All M1 Kits
2	M1 KC Supercharger Inlet – Bolts to the Supercharger (12) & Throttle body	All M1 Kits
3	HMW SS Manifold – Replaces stock engine manifold, custom variations for S50, S54 engines	All M1 Kits
4	M1 KC Front Main Bracket – Attaches to idler pullies (9) and bolts to part 5 & 1	All M1 Kits
5	HMW PS Bracket – Replaces OE Power Steering bracket – M52/M54 has different variation	All M1 Kits
6	M1 KC Rear Support Bracket – Bolts to engine support arm & bolts to rear of part 1	All M1 Kits
7	M1 KC Side Support Bracket – Bolts to side of engine & side rear of part 1.	All M1 Kits
8	Idler Spacers – Bolts between part 9 & 4 to space idler pullies (9) for belt routing & tension.	All M1 Kits
9	3x Idler Pulleys – Bolts to part 4 with part 8 sandwiched in the middle.	All M1 Kits
10	Top Radiator Hose – Flexible hose that is used to replace stock top radiator hose.	All M1 Kits
11	Nuts Bolts & Washers – Various Sizes for bolting the entire kit.	All M1 Kits
12	Supercharger – Typically an Eaton M122H or a TVS2350 Supercharger	Full M1 Kits
13	Intercooler – Typically a 27" Intercooler for air to air intercooling	Intercooled Kits
14	Intercooler Piping – Aluminum Pipes & Silicone Hoses to be used with part 13	Intercooled Kits
15	Hose Clamps – To be used with part 14 to tighten and secure silicone hoses.	Intercooled Kits

## **Pulley Options**

A rule of thumb on superchargers: the smaller the pulley, the faster you spin the rotors and the more power you output. The stock M122H Supercharger has a 3.2" pulley which outputs around 14PSI with an air to air intercooler on most 2.5-3.2L BMW straight six (6 cylinder) M5x & S5x family of engines. This is already pushing the engine in its stock form beyond its limits. The stock bypass valve can be calibrated and used to keep the boost around 9PSI for street use on a stock engine which combined with a good tune can be the best balance between power and engine & drivetrain longevity.

**Custom Pulleys:** If the engine is built you can upgrade the stock supercharger pulley to a variety of custom aftermarket pullies such as a 2.8", 2.6" and in some cases a 2.4" pulley. Typically, the aftermarket pullies come with instructions that are also available online, they also require a special tool to be used to remove the stock M122H pulley and install the new one.

#### Note: Adding an air to air intercooler usually will result in a boost drop of 2-3PSI.

Please ensure your car is 100% healthy before you even begin installation. Start with a good engine and chassis, ensure all common seals, gaskets vice versa have been replaced or least aren't leaking and that the car runs well with no vacuum leaks, engine or transmission issues. A party Smoke & Fog machine from online stores can help detect typical vacuum leaks. Also plugging in a code reader to read any codes if there are any before installation is a good idea. Alternatively, just setting up INPA on an old laptop with some proper FTDI Chipped USB or ADS Serial cables is also a great step in self-diagnosis of your car for any future error code diagnosis. When satisfied and ready to commence, unplug the cars battery and put it on a tickle charger as the installation can take days.

#### **Preventive Maintenance**

As preventive maintenance the bare minimal you should do is replace all the potentially leaky gaskets in your car as the valve cover gasket with fresh O-rings, oil pan gasket, oil level dipstick O-rings, oil filter housing(if leaky or warped) etc. Minimum injector size is 42lbs for the M1 kit running 9PSI-14Psi, 60 – 80lbs is recommended for most optimal operation. You may want to upgrade your MAF sensor as well. Clean the ICV, use new spark plugs, and finally replace your fuel filter. Cam and Crankshaft Position Sensors should be replaced with OE Genuine or OEM Brand if they are still the original ones that came with the car, this is not always required but you would hate it to be stuck in traffic or at the side of the road unable to start up which is the case if these two sensors fail. Sometimes even the o2 Sensors can fail from the running the car too rich after the SC is installed till your tune is resolved. But we are not suggesting go and replace all sensors in a bid to prevent what may go wrong, but we are giving you an overview of things that tend to go wrong and to consider them later down the line.

Another part that is quite essential is the old factory belt tensioner, this should be replaced with a new one. It is an easy replacement that requires minimal effort. Otherwise it can be a reason for belt <u>slippage and boost loss</u>. It is recommended to use the *mechanical spring loaded tensioner*. This may also be a time to check if you have the *extra pulley on your alternator* and if you don't, add it. Some cars came with it and some without.

## **Pre-Installation: Chapter 1**

Before going into installation however, we would like to make some more suggestions, as making room as well as some required & recommended modifications that will help you get the most out of your setup. They are as follows:

### Positive Crankcase Ventilation (PCV/CCV) Delete

The factory CCV/PCV system found in newer OBD II cars as the 323i/328i/528i/523i etc often fails. Many people prefer to delete this system. If you are running any kind of boost then **it is required** to not have the crank case cover vent line connected to it, such as the BMW CCV filter, since this will no longer work as intended. With added positive pressure (boost) not only the crank case ventilation will be blocked but also the crank case itself will be pressurized. The engine will no longer be able to vent the crank case fumes. This results in all kinds of problems and damages in the long term, along with e.g. leaks from the valve cover or engine oil pan. If running the HMW SS manifold, you can simply leave out the CCV system. On the internet there are plenty of videos and guides on "PCV Delete" which you can use as a resource. It is 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.

### **Crankcase Venting**

As for venting the crankcase, consult your local laws and regulations for emissions and such. Traditionally it has been vented to the atmosphere, alternatively you can have the line connecting to the intake of the supercharger and remembering to block the line coming out of the dipstick. You can also add an oil catch can. The crank case cover vent line goes into one barb while you can either have a line coming from the oil dipstick or the intake into the other barb, this will however require you drain the catch can every few months. The other method to not have to drain the catch can is to modify the oil catch can, and introduce a hole on the bottom. Add a barb fitting that connects it to the oil dipstick using a silicone oil resistant hose, the top simply has a tiny filter to vent out the fumes, therefore eliminating the need to vent. Advanced users may try to use a venturi system or read up on it.

#### **Power Steering Pump**

If you don't have the M50 power steering and you are planning to use the M1 kit on the M50/S50 engines then we recommend you to use the LF30 pump. We also offer an adapter plate for the M50 power steering. Certain M54's are equipped with the LF20, yet can be swapped with an LF30 pump. Downsides of having the LF20 is that it is prone to brakeage. Due to the cast housing, it may require some trimming of the adapter bracket / housing on the side to get it to fit properly.



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#### **IAT Sensor**

You will retain your original Idle Air Temp (IAT) sensor. Don't mix an OBD I sensor up with an OBD II since it won't work, e.g. the M50 motor will use the sensor it came with while an M52/M54 will use the OBD II type it came with. You should place the sensor in the manifold by threading the sensor itself with a 'tap and die'. Thread the right sized hole in the manifold. This will allow it to detect the correct charge air temperatures after the air has passed through the intercooler.

#### **Idler Pulley**

We provide the correct idler pulleys with the kit. The idler pulley is necessary to apply more tension and wrap to the belt. These pullies simply bolt on after you have installed the brackets. Alternatively, BMW part number 11281748131 pulley can also be used.

#### **Radiator Hose**

The kit ships with a custom top radiator hose. You will be using this hose to replace your existing factory or aftermarket radiator hose.

#### Belt

The right sized belt to get the setup started for the stock 3.2" supercharger drive pulley and the stock M5x crank pulley is already provided in the kit. The belt is a Gates K060819, which is a 6PK2082. With a 2.6 overdrive pulley on the M122H supercharger the belt size used is Gates K060810, which is an 6PK2058. Other sizes can also be ordered, either from us or from your nearest automotive store. The size of the belt will always depend on your pulley sizes for the Crank & Supercharger as well as belt orientation. Below is the belt recommended belt routing.



## **Pre-Installation: Chapter 2**

Before we can begin the installation of the HMW M1 KC kit, we must begin by removing some components to make room for the new kit. While most of this is straight forward, it can be overwhelming for a beginner. This also involves removing your fuel rail and injectors, because there is also a fire hazard. *Therefore, kindly use all safety precautions before proceeding!* 

Since this guide is centered on the installation aspect of our kit itself, we will cover the basics of the removal of the required components below. Rest assured there is nothing too complicated that is involved and at any time you have doubts or questions, simply contact us. Alternatively, just use your shop manual if you have one, or a quick search on the internet will bring out many DIY guides & videos. You may also use our recommended resource, which is *Pelican Parts & 101 Projects*, an entire series for these cars. Many more can be found here <a href="http://www.101projects.com/BMW/index.htm">http://www.101projects.com/BMW/index.htm</a>

You should also take pictures and label things for convenience so that you don't lose anything and know how to put it all back together.

**Intake Piping, Stock Airbox & MAF Sensor** - from the throttle body. They are connected using hose clamps. The airbox is usually held on by two bolts and some clips. Remove the MAF sensor and store it in a secure place. Remember its orientation when reinstalling, the arrow points towards the airflow direction which is going to the engine.

**Intake Manifold, Fuel Rail, Injectors** – removal of the intake manifold requires you to remove all the associated pipe work mentioned earlier and more, such as the ICV and the throttle body. The fuel rail must also be removed, this will grant you access to the bolts on top as well as the bolts on the bottom 2 brackets that hold the manifold in place.

**The Bumper** – remove the bumper trims. Now you will have 4x 13 mm nuts. Look under the front wheel wells, assuming your wheel well liner plastics are still in one piece. You will see a screw on each side that holds the bumper. Now double check for any other screws or bolts underneath. You should be able to just slide the bumper off forward, 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.

**Top Radiator Hose** – once the car has sat and cooled down, you can remove the top (hot) radiator hose. Prepare for some spillage and mop as needed. <u>Be sure to refill and bleed the cooling system</u> once you are done installing the radiator back at the final stages. If you don't bleed the system properly you will leave many air pockets which will end up causing your engine to overheat. Use the proper coolant premix. For testing purposes, we use pure distilled water in our builds.

**Power Steering Reservoir**- it's held on by 2 bolts on to the engine mount or the oil filter. This is dependent on the model of car and engine. On some models the engine support arms have a spot to bolt it on. Simply relocate the reservoir as needed.

**Power Steering Pump Pulley** – there are 3 bolts holding it in place. Jamming a screw driver in the belt can help locking it or having a friend give you a hand while you undo them. Be careful not to break it, there are metal ones available,

AC & Serpentine Belt – take out the power steering pulley bolts before you remove the belt. First take out the power steering belt and then the AC one. It has got a hydraulic tensioner with a locking mechanism where you can use alien keys to lock them in, if you are missing the locking tools.

**Power Steering Pump & Bracket** – this is the final part. There are 5 bolts in total and this is what our main front bracket will replace. Keep a track of the bolts, sizes vary. Once it is 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!

## Piping & Coupler Guide

Please find below a list of pipes and couplers that are included in the *M1 Intercooled Kit*. All pipes and couplers are 63mm (2.5"). The length of each of these pipes will depend on the end user's needs, the type of intercooler and where it is mounted. On some chassis and engine combinations you may require more piping than we supply. The E30, E36 and E46 are all quite a bit different, while the 5 Series, 7 Series, Z3 & Z4 are in a category of their own. Below we also describe in a short summery how the intercooler piping is done, using the kit on an E36. A detailed guide with pictures is presented in the installation section.

You can also purchase these pipes and couplers from your nearest automotive parts stores or online. It is best to use thick walled 3 – 4Ply silicone hoses, so they don't collapse and good quality, as in fuel/nitrate/oil rated hoses, in general. It is also recommended you use good quality clamps throughout. Also use steel or brass joiners only, as plastic will melt or deform.

- 45 degree from discharge pan, stopping just before power steering pump and sway bar.
- 45 degree (short) from the first 45 degree, extending in front of the sway bar then directed towards left side of the car and down, slightly.
- 45 degree (short) from the second one, pointing forward towards intercooler. This creates a zigzag past power steering pump and sway bar.
- 90 degree out of right side of intercooler, running horizontal under crank pulley.
- 90 degree off of the above 90°, over to the left side, then straight up about halfway point of radiator.
- 75 degree off of the above 90, up and back towards the engine.
- 45 degrees from the above 75 degree, into the intake manifold.
- 9x Straight Silicone Couplers.
- 15 T bolt clamp.

### **Bolts & Spacers Guide**

Part Name	Quantity	
Discharge pan to supercharger	M8 by 45 mm. 10 bolts and washers	
Throttle body relocator to supercharger	Throttle body relocator to supercharger	
Idler pulleys	M10 by 50 mm. 2 bolts nuts and 4 washers	
Rear mounting bracket	M8 by 20 mm. 3 bolts nuts and 6 washers	
Upper alternator bolt	M10 by 150 mm. 1 bolt and washer	
Front mounting bracket to PS bracket & OFH	M8 by 80 mm. 2 bolts 2 washers	
Power Steering (PS) pump bolts	M8 by 80 mm. 2 bolts nuts and washers	
	M8 by 100 mm. 2 bolts nuts and washers	
Front main mounting bracket to discharge pan	M8 by 15 mm. 3 bolts and washers	
Idler pulley spacers.	30 mm OD by 10.2 mm ID by 19mm long, 3 pcs	
Power steering pump spacers	15 mm OD by 8.2 mm ID by 25 mm long, 2 pcs	



**Pic 1:** First picture is, once you have removed the stock engine intake manifold and associated parts. This is what the engine compartment should look like before installing the supercharger kit.



**Pic 2:** Once the engine manifold is removed, cover up your intake ports with some tape to ensure nothing accidentally falls inside as you work on it.

**Pic 2.A:** The plastic cover part of the injector harness cover has to be often removed for the M1 custom SS intake manifold. Simply remove the cover which is held in place by plastic tabs and use electrical tape or tubing to wrap around any exposed cables.





**Pics 3, 3A:** Use a longer hose on the idle control valve. It will go up and connect to the large port on the rear side of the supercharger. The inlet hose on the bottom of the idle control valve will have to be extended up to the throttle body. That will be connected to the air intake between the MAF and throttle body.



**Pic 4:** On the E36 - if you have the early generation ABS brake unit, you can add two 90-degree PVC elbows to the side of the E46 reservoir. Drill and tap these and screw in the fittings. For a little extra insurance, you can also add some plastic epoxy.



**Pic 5:** There are 2 different types of power steering pump brackets that are supplied in the kit. On the left, you will find the traditional OBD I power steering pump bracket suitable for M50, S50 motors. And on the right, there is the OBD II

(M52/M54/S52/S54) type power steering pump bracket. Depending on your engine and power steering pump, you will have to use one or the other.



**Pics 5A, 5B:** This is for the older style M50, with the cast aluminum power steering pump bracket. For the newer LF30 type, please see below. Note, that the OBD I power steering pump can easily be upgraded to the LF30.



**Pics 5C, 5D:** The four bolts, that hold the bracket to the pump are also the same bolts that hold the pump together. You will have to keep the pump together while you remove all four bolts.

**Tip:** We recommend to secure a large C-clamp into a bench vice. Place the power steering pump in the C-clamp. This way you can apply some pressure to the front hub of the power steering pump and the rear housing. Tighten the C-clamp down, just a little bit more than when it touches. You shouldn't force the pump together, just

hold it, so it doesn't come apart. There is a pressure regulator valve and spring in the rear of the pump, that will try to push it apart.

Side note: if your pump is leaking, we recommend to take the pump apart and replace the seal.

With the pump secure, remove all four bolts and allow the original power steering bracket to slip away onto the C-clamp and away from the pump hosing. Use 2 shorter bolts and nuts and place them diagonally on the pump housing, to hold it together.



**Pics 5E, 5F:** Remove the pump from the C-clamp and take the aluminium bracket off. Put the HMW bracket on the C-clamp and reinstall the pump. Same as before, but just a little bit of pressure on the pump with the C-clamp, so that you can remove the two bolts.

Then slip the HMW power steering pump bracket up into place and install the 8 mm bolts supplied in the kit.

The two 80 mm bolts are for the short side, without the rear bracket. Use the two 100 mm bolts on the other side of the pump and then



reinstall the spacers and rear support bracket, that was on the pump originally and attaches to the oil pan. Once all 4 bolt nuts and washers are installed and tightened, you can remove the pump from the C-clamp and it is ready to be reinstalled in the car. Note, on the S52 US engine you may have to drill out the holes slightly to what is in the bracket already.



**Pics 6, 6A:** For those with the M52/M54 engine type, use this type 2 power steering bracket mounting on the power steering pump.

Remove the 3 torque head bolts that secure the original power steering pump bracket. Replace it with the type 2 power steering pump bracket.



**Pic 6B:** You also need a single 5 mm spacer between the power steering pump bracket and the main front bracket to space the power steering 5mm back.



Pic 6C: Install the M10 x 50 mm bolts into the front mounting bracket.



**Pics 6D, 6E:** Note, the two 25 mm spacers go behind the lower front mounting bracket to the oil filter hosing on the M50 engine. The M54 engine is similar, however the M52 with OEM factory stamped steel power steering bracket does not need spacers.



**Pics 7, 7B:** This bracket needs to be cut off, if present to clear the M1 discharge pan. The engine manifold support brackets also need to be unbolted and removed.



Pic 7A: The power steering reservoir needs to be relocated. Depending on how you are

running your charge pipe, you may have to modify the power steering pressure hose.

**Pics 8A, 8B:** Use the two 8 mm bolt included in the kit with washers to secure the power steering pump bracket to the front of the front mounting bracket - through the two 25 mm spacers. Then into the oil filter housing. Then use the one M10 X 150mm bolt with the washer into the idler pulley which is provided in kit, then into the upper front mounting bracket hole, into upper alternator, then into the oil filter housing. Once all three of these bolts are started reinstall the bolt that secures the rear power steering bracket to the side of



the oil pan. Then you can tighten the two lower 8 mm bolts.



Note:do not tighten the upper 10 mm bolt just yet. If you do you will not be able to get the 8 mm bolt in, that connects the front mounting bracket to the discharge pan because the idler pulley will be in the way.

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**Pic 9:** At this point in the install, it is a good opportunity to install the charge pipe that will run from the discharge pan to the intercooler. In the picture we used a blue coupler that is connected to a 45-degree charge pipe running next to the alternator. Then two short 45-degree charge pipes, to offset out to the intercooler.

The charge pipes can be installed later but it is much easier to do it now.

More on the intercooling stage later on in the guide.





**Pic 9A:** Remove the nut from the motor mount and install the vertical rear support bracket.

**Pic 9B:** Mount the horizontal support bracket to the side of the engine block.



**Pic 10:** The alignment tab under the front of the supercharger will have to be removed. You can use a file. Or if you're very careful, you can use a flapper wheel desk. But make sure you cover up the underside of the supercharger, so no metal filings or shavings get into the supercharger rotors.

**Pic 10A:** The discharge tube, welded onto the bottom of the discharge pan is longer than most likely what will be needed. The length will be determined by the way, you plan on running the charge pipes. You can cut it short to fit your needs.



**Pics 10B, 10C:** Once you have all that set up, you are ready to install the discharge pan. Put the discharge pan down in where it's going to go and line up the discharge tube with your charge pipe. Make sure your clamp is already on there. Use the three 8 mm bolts from the kit to attach the front mounting bracket to the front of the discharge pan. Use one 8 mm bolt nut and washer, to attach the vertical support bracket to the discharge pan. Do the same with the horizontal support bracket.

Once the three front bracket bolts are tight, you can tighten the 150 mm bolt with an idler pulley. Then tighten both rear support brackets.





**Pic 11:** After the discharge pan is fully secure. You can finish positioning the charge pipe and tighten the clamp.

**Pic 11A:** Even though the powder coat looks very nice and holds up for many years, you will want to scuff the area where the gasket sets so that it has something to bite to. This will help keep the gasket in place under boost.





**Pics 11B, 11C:** Use some gasket adhesive to secure the gasket in place, then install the supercharger



**Pic 12:** Block off the small port above the larger one on

<image>

the side of the supercharger so that it does not interfere with the intake plenum. Then tap the port on the rear corner of the supercharger and install a fitting. This is a good vacuum source for the bypass valve as well as the PCV system. Connect the idle control valve to the larger port on the side of the supercharger.



Pic 12A: Install and route the drive belt through the pullies as shown in the picture and the diagram earlier in Chapter 1.

**Pic 12B:** Now, install intake and throttle body on the supercharger. Here we used a 76 mm throttle body which is supposed to be an upgrade from the older 5L Fox Body Ford Mustang engine. Also, we modified the BMW throttle position sensor. You can retain the BMW throttle body and use that as well. If installing this on the later drive-by-wire throttle body engine, we suggest sticking with the BMW throttle body as it will simplify tuning and work just as well.





**Pics 12C, 12D:** As the throttle body is installed, make sure to use the gasket provided or use a custom gasket.





**Pics 12E, 12F, 12G:** You will also need to extend the throttle body wire. For older M50, M52 engines that use a throttle cable, we provide an extender kit in the M1 kit which includes a junction box and additional wiring. Simply remove the throttle cable from its existing location on the throttle body. There are 2 small plastic tabs that retain the cable in place. Once removed, use the junction box and extra throttle cable to extend the throttle body operation.

Note: Extender kit with M1 Rev 1 shown in Pic 12E and for M1 Rev 2 in Pic 12F.

On newer electronic throttle body equipped models with the drive by cable as the M54; you will need to simply extend the electrical wiring of the connector. On the S50, S54 type engines found on the M3 that uses the Individual Throttle Bodies (ITB) you will be supplied with a custom HMW SS manifold which retains the ITB setup and stock throttle body location while utilizing just a bypass valve.

**Pic 13:** You will have to drill and tap the bottom of the intake plenum for the intake air temp sensor, and fittings for vacuum boost hoses that you may need for things such as a boost gauge, Rising Rate Fuel pressure regulator, stock fuel pressure regulator, standalone ECU map sensor or anything else that needs to have a boost and/or vacuum reference. This would have to be done before the intake is installed.





**Pic 13B:** Thoroughly clean around each intake port. We recommend 3M scrub pad and brake cleaner. You don't want to remove any aluminium from the cylinder head, that will cause the intake gasket to not seal properly. Ensure nothing has gotten inside the ports, which should be the case if you have taped the ports while you worked.

**Pic 13A:** Install new intake gaskets on to the intake flange. You can use a little dab of high temperature red silicone to make sure the gasket seals.

**Pics 13C, 13D:** Use a little dish detergent on the O-ring seals on your injectors. And install them into the fuel rail, securing them with the retaining clips. Then install the fuel rail and injectors into the intake manifold. You may have to enlarge the bolt holes



in the fuel rail to accept the 8 mm bolt for the intake manifold.

Note, if you are using aftermarket fuel injectors that have a much larger body, you may have to open up the top portion of the injector bungs in the intake manifold.



Also, if you are using the kit on an M54 engine, then kindly ensure you have the HMW M54 adapter plate for the manifold.

Now, connect fuel lines and injector harness to injectors. Connect the intake air temp sensor, and all vacuum lines.



**Pic 14A:** Mount the intercooler behind the front bumper. Here we demonstrate this using two pieces of flat stock aluminium that is bolted to the metal bumper and then the intercooler bolts on to that.

**Pics 14B, 14C:** Run the charge pipe from the bottom of the discharge pan, down and bored, and between the power steering pump and front sway bar. Then use two 45degree charge pipes to connect that to the left side of the intercooler.





Run the charge pipes from the right side of the intercooler underneath of the front of the car over to the left and then a 90-degree up. Now, you can connect the charge pipe up to the intake manifold.



**Pics 14D, 14E:** This is an example of how your piping should look like once its plumbed in. Note this is on an E36. The E46 and other models will be slightly different, so try a few variations till you have found what works best for you.



**Final Steps & Tips:** Start reconnecting back all the essentials, such as the radiator, which are all reverse of taking it off. Connect all coolant hoses. Open the bleeder valve on the expansion tank and start the fun process of filling the cooling system and trying to get all the air out. While you're waiting for some of the air to bubble up out of the expansion tank, connect the battery and turn the ignition switch a few times off and on , to purge the fuel system. Check for any fuel leaks. If everything looks good, start the engine. It may not run too good at first, there will still be air in the fuel rail that has to work its way out and the ECU will have to relearn the idle. Turn your climate control up to the hottest setting, check and add coolant as needed till air bubbles are out. Ensure to keep a close eye on the temperature gauge.

**Check for any leaks**, check to make sure that the bypass valve is open while idling. This helps keep the temperature down in the supercharger. And keep the charge temperature down when the supercharger is not being used. A quick snap of the throttle should make the bypass valve close and then open again, once you release the throttle.



This is what your setup should look like, once it's completed.

**Tuning & Maintenance**: Although you can always use some of our tunes provided as a guide, we very strongly suggest getting the car professionally dyno tuned. Eventually camshaft timing adjustments may be required during tuning for better idling and overall performance. The stock ECU ignition and fuel maps are not set up for over a bar of boost. We have found that 60 lb injectors are the minimum needed and a rising rate fuel pressure regulator also helps in small adjustments when tuning. The supercharger's synthetic lubricating oil should be changed every 6000 miles or 10,000km. Use the oil approved by the manufacturer, as any other fluid could likely damage the supercharger. All other regular periodic maintenance and inspections of the car, engine & drivetrain should be continued as required and on time.

This concludes the installation of the HMW M1 K.C. Supercharger Kit. For any further questions, support and information, please contact us directly via phone or email at <u>HYDE@HYDEMOTORWORKS.COM</u> or <u>KEITH@HYDEMOTORWORKS.COM</u>. We hope you enjoy your new supercharged BMW and wish you happy and safe motoring!