

# BRAKE TECH BOOK

ULTIMATE GUIDE TO FITTING, SETTING UP, MAINTAINING AND  
GETTING THE BEST PERFORMANCE FROM YOUR BRAKES

*hope*

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**H**ope brakes offer the best performance in terms of power, modulation and consistency every time you pull the lever. Riders demand a lot from their brakes, this means set-up and maintenance are critical to get the best performance. There is a lot of information and advice available in this area, sometimes good, sometimes bad, often conflicting. This document collates all the knowledge we have gained in our 30 years of designing, manufacturing and testing the ultimate bicycle

disc brakes and is our comprehensive guide to the Hope range of brakes, if you own Hope brakes; this is the only reference you need. Finally, we build our brakes to last. If a part in either our caliper or master cylinder/lever needs replacing... well, you can do just that. We absolutely guarantee that spare parts for your brake will be available for a minimum of ten years after you buy your brake. Put simply, a Hope brake is not only a pinnacle in design, manufacturing and performance but something to enjoy for many years in the future.



**Y**our brake instructions detail the basic installation of your brake. This document goes into further detail to enable you to get the perfect set-up.

Once you have installed your brakes follow these steps to achieve the perfect set-up. The initial set-up is critical to get the best and consistent performance from your Hope brake. Getting this right will get the best performance, improve life of wearable parts and keep future maintenance to a minimum.

### 001\_BRAKE MOUNT

It's important to make sure that your brake caliper is perfectly square to the disc. If not, the pads will hit the rotor at an angle. The brake mounts on a frame or forks may not be perfectly square. Paint blobs, metal burrs or less than perfect manufacture can sometimes leave them a little off. Have a check for anything obvious and if you have any doubts, use a facing tool to rectify them. Depending on rotor size you may need to use a brake mount adaptor. Double check you have the correct mounts for your chosen disc size. For example: running a 203mm mount with a 200mm rotor will feel okay initially but in time it will cause un-even pad wear and poor performing and feeling brakes. Check that there is enough lateral adjustment of the caliper to get the caliper centred over the disc. Sometimes mixing components from different manufacturers can lead to alignment issues. Using Hope brakes with Hope mounts and hubs will guarantee proper alignment can be achieved.

#### General advice:

>> All our brake mount adaptors are CNC machined specifically to ensure the caliper position will be optimal and square.

**DO NOT use spherical washers** as they allow the caliper to sit at an angle. Only use a single mount per caliper.

>> See page 015 to check you are using the correct mount.

### 002\_CALIPER ALIGNMENT

This helps piston/pad alignment and guarantees balanced piston position for the best lever feel. Centre the caliper to the disc before installing pads, do not pump the lever with pads installed and tighten the bolts! You should be able to adjust the caliper so the disc runs perfectly centrally through the slots at the front and rear of the caliper. See diagram 002. If you can't, go back a step and re-visit the caliper/disc mounting. Always use washers under the caliper bolt head.

**DO NOT use spherical washers.** Bolts used without a washer will dig into the aluminium and force the caliper into one position making adjustment more difficult.

#### General advice:

>> Centre the caliper to the disc before installing pads, see diagram.

>> Do not pump the lever to align the caliper.

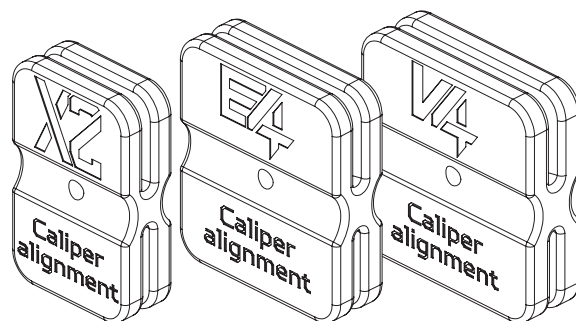
>> Always use washers under caliper bolt head. **DO NOT use spherical washers.**


>> Tighten to 9N.m.

#### Available tools:

The caliper alignment 3D printable tool can help the process.

 [Link to 3D printable tools.](#)




 **Video:** How to align and lubricate caliper pistons  
<https://vimeo.com/255874098>

### 003\_PAD ALIGNMENT

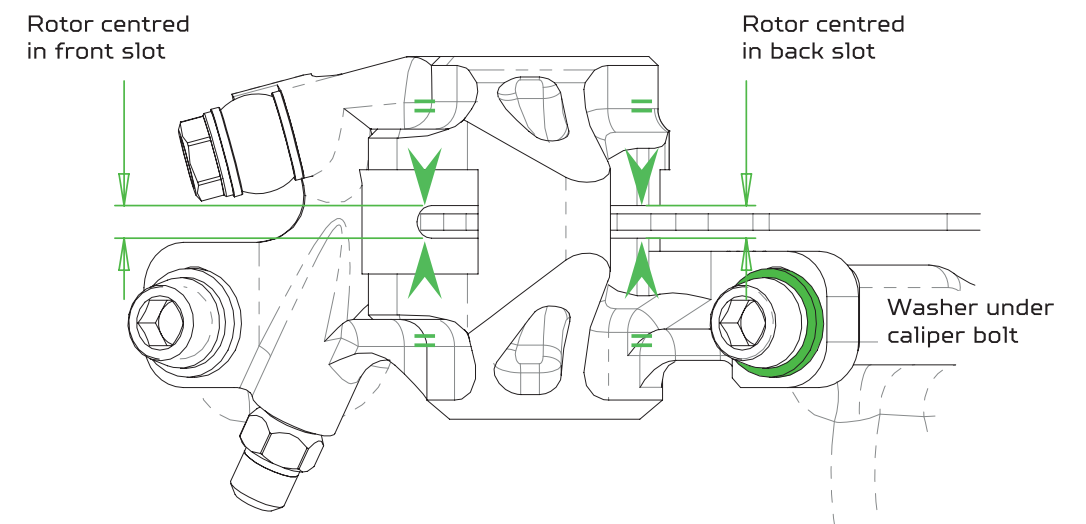
This is a quick process but has a great influence on brake lever feel. Push all pistons in the caliper all the way back into their housing. Fit a new set of brake pads. Pump the lever to push the pads out until they contact the disc. Each pad should sit away from the disc an equal amount and travel the same amount when the brake is applied. See diagram 003. A disc bending when the lever is applied is evidence of badly balanced pads, all parts of both pads should contact the disc simultaneously. Adjust the piston(s) by levering behind the pads, holding the opposite piston(s) back to allow the opposing piston to come out further.

#### General advice:

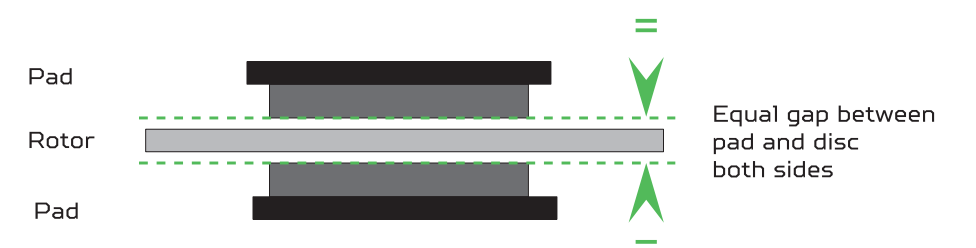
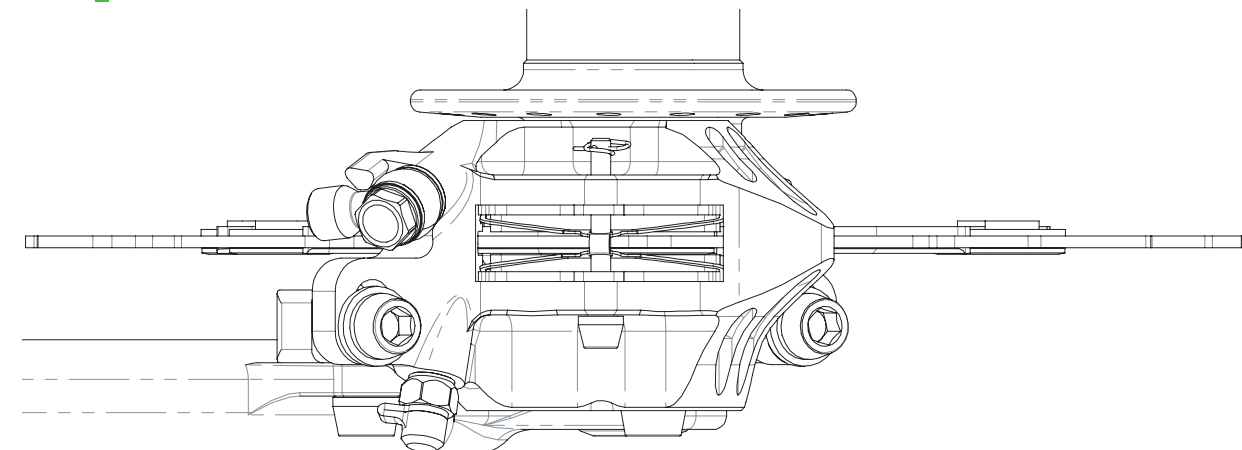
>> Both pads should contact the disc at the same time without causing the disc to bend to either side, see diagram.

 **Video:** How to align and lubricate caliper pistons  
<https://vimeo.com/255874098>

### 002\_CALIPER ALIGNMENT



### 003\_PAD ALIGNMENT



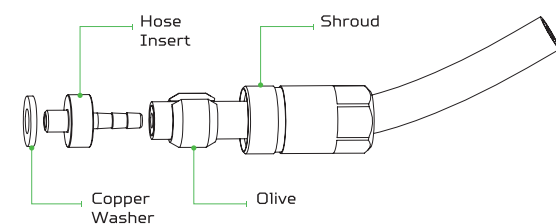


### 004\_CUTTING AND SHORTENING A HOSE

All brakes are now supplied with 2m hose length. This means most brake hoses, front or rear, will need cutting to length. We recommend leaving brake hoses uncut for initial fitting and set-up. Once the brake has been set-up and good function confirmed then proceed to cutting and shortening the hose. Shortening the hose once the brake is installed also helps to determine the correct length and minimises fluid loss. Cut and shorten at the **lever end** of the brake. Make sure to assemble the hose fittings in the correct order, the shroud needs fitting over the hose before the insert is fitted.

We always recommend a **full brake bleed** after shortening the hose.

### HOSE FITTING ASSEMBLY



### 005\_BRAKE BLEED

Any newly installed brake that required hose shortening will require bleeding. We recommend using our Easy Bleed kit funnel, the bleed process can be completed without, but you must pay attention to the fluid level in the master cylinder reservoir; don't let it drop too low or air will be drawn into the system.

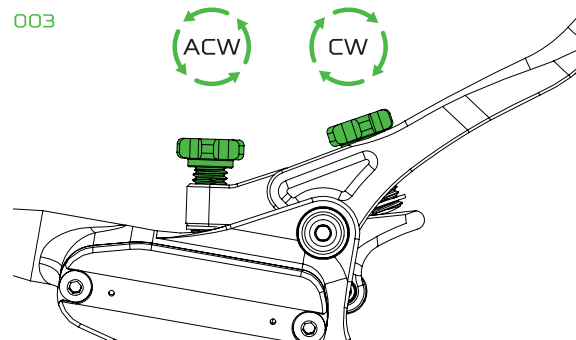
📺 **Videos:** For the Tech 4 master cylinder <https://vimeo.com/834698535>  
Same basic procedure can be followed for any Hope Tech master cylinder.

### BLEED SET-UP:

001\_Hold the bike in a bike stand and remove the wheels.

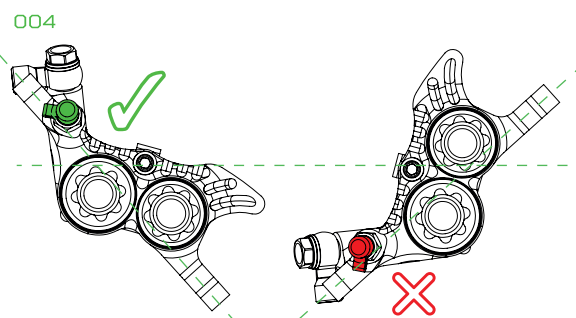
002\_Rotate the master cylinder (M/C) so that the reservoir sits in a level position  
**TIP:** It can help to rotate the handlebars in a bike stand and strap them to the top tube of the bike.

003



003\_Position the lever adjustments so both reach and bite point are fully out (reach adjuster turned fully clockwise and bite point adjuster turned fully anti-clockwise).

004

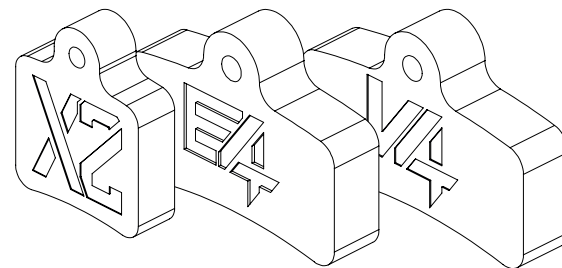


004\_Make sure the caliper bleed nipple is positioned on the top of the caliper. Usually front calipers can remain attached to the bike while rear calipers should be removed and dropped below the bike. This is especially important where rear hose routings create a dip around the bottom bracket area; try to position the caliper so it sits at the lowest part of the system to avoid creating an air trap.

005\_Install the relevant bleed block for the caliper or an old set of brake pads. Don't attempt to bleed the brake with **no pads or bleed block** as you risk the pistons coming out of the caliper.

**NOTE:** Do not use third party bleed blocks that fill the pad slot in the caliper and keep the pistons pushed back in the caliper housing.

🖱️ [Link to 3D printable tools.](#)



006\_Remove the M/C reservoir cap, if using the easy bleed funnel attach it to the M/C following the instructions provided with the easy bleed kit. Fill the funnel with DOT5.1 brake fluid.

007\_Fit an 8mm spanner over the caliper bleed nipple and then push on either the bleed kit nipple adapter/hose or any piece of appropriate diameter clear hose. Route the other end of the hose into a waste container.

### BLEED PROCEDURE:

001\_Remove the easy bleed kit reservoir plunger if using or make sure the M/C reservoir is full of fluid.

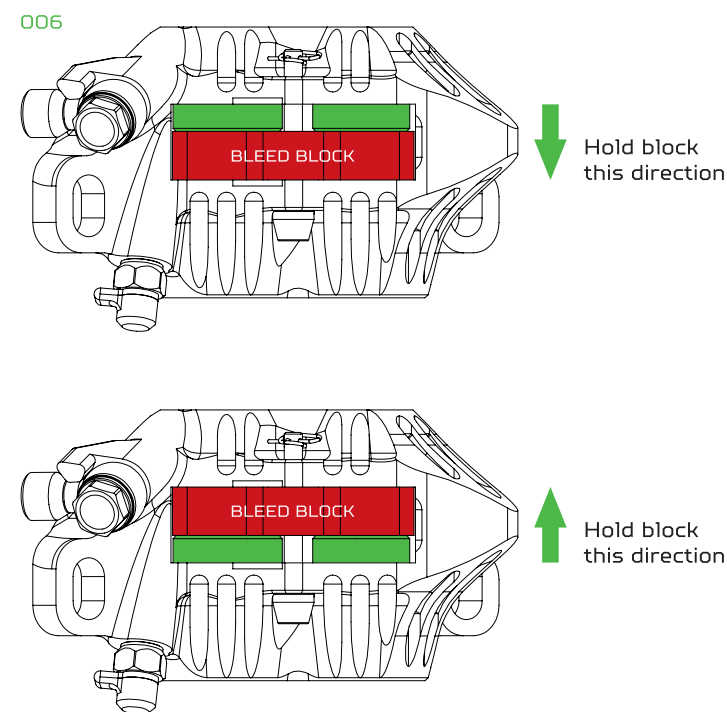
002\_Pull the brake lever until you can feel resistance, or it pulls in fully to the bars.

003\_Keeping the brake lever pulled in, open the caliper bleed nipple (a quarter of a turn is usually enough). On a totally dry system no fluid will flow initially until steps 002 to 004 are repeated several times.

004\_Close the bleed nipple and then release the brake lever.

005\_Repeat steps 002 to 004 until clean oil flows out of the waste pipe with **no air bubbles**.

006



006\_With the bleed nipple closed, pump the brake lever to move the pistons out of the caliper. Hold the piston/pistons on one side of the caliper back in the housing, using a flat blade screwdriver against the bleed block or pads, so that the opposite pistons come all the way out to contact the bleed block.

**NOTE:** Make sure there is enough fluid in the M/C reservoir before pumping out the pistons.

007\_Open the bleed nipple and push the exposed pistons all the way back into the housing, forcing any trapped air out from behind the caliper pistons.

008\_Repeat step 007 and 008 for the pistons on the other side of the caliper.

009\_With the bleed nipple closed, pull the brake lever and check for a solid lever feel. If a good lever feel isn't achieved repeat steps 002 through 008.



## INSTALLATION BLEEDING YOUR BRAKE

### FINISHING PROCEDURE:

**001\_**Tighten the bleed nipple taking care not to overtighten - 8N.m. Remove the waste pipe and bleed nipple adapter.

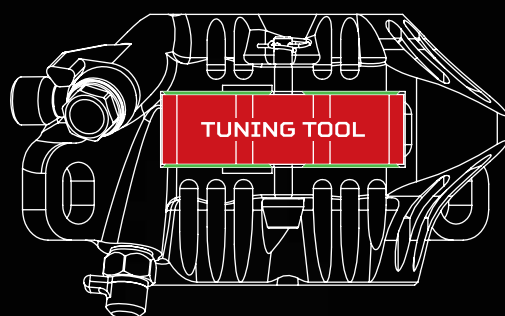
**002\_**Remove the bleed funnel and lid if using. Replace the plunger in the bleed funnel before removing.

**003\_**Push the caliper pistons all the way back into the housing. Keep an eye on the fluid level in the M/C reservoir, pushing the caliper pistons back will force fluid up into the lever and can cause it to overflow so work slowly.

**TIP:** Watch the fluid in the reservoir as it flows up, there should be no air bubbles, flick the lever allowing it to snap back into position and check for any air bubbles. If bubbles are present repeat bleed procedure steps 006 to 008.

 [Link to 3D printable tools.](#)

004



**004\_**In the case you are using a V4 caliper in conjunction with 1.8 or 2.3mm thick rotors i.e. none vented, there is an extra tuning tool available. After pushing the caliper pistons back in the housing swap the bleed block for this piston spacing block, then pump the pistons out until they contact the block. This allows a larger fluid volume in the brake when running with thinner rotors and will

help to maintain consistent performance during hard use.

**005\_**Top up the M/C reservoir with brake fluid so the level is flush to the top.

**006\_**Replace the M/C reservoir rubber diaphragm. Place down the diaphragm gently to avoid trapping any air under it, it will displace some fluid so have a rag ready to clean up any overspill.

**007\_**Re-install the M/C lid. Take care not to over tighten the M3 screws.

**Recommended tightening torque:** 1 N.m

**008\_**Clean up any residual brake fluid left on the brake using warm soapy water

**009\_**Remove bleed block or old pads from calipers.

**010\_**Re-fit calipers to bike if removed for bleeding and install the wheels.

**011\_**Install new brake pads.

**012\_**Any calipers that have been removed will need re-aligning see installing and setting up your brake section 002.

**013\_**Align and centralise pads. See page 004 'Setting Up Your Brake'.

### General advice:

» Use only DOT5.1 (or DOT4 brake fluid) - exception being RX4+ MIN calipers

» It is highly recommended to use latex gloves and protective glasses when bleeding brakes.

» You shouldn't need to bleed your brake more than once a year.

» Always bleed the brake after shortening the hose.

» Pay particular attention to rear brakes, we always advise removing the caliper from the frame for bleeding.

» Always work caliper pistons to remove air from the caliper with bleed nipple pointing upwards.

» Be careful that the hose isn't creating a loop, especially inside the frame or around a motor if on an E-Bike.

» At the end of brake bleed, make sure to fully push all caliper pistons back.

» If left on painted surfaces brake fluid can be corrosive. Always clean up thoroughly after bleeding.

» Dispose old brake fluid at a recycling centre, be responsible.



**Y**ou oiled your chain, now time to show your brakes some TLC, they need love too! Routine maintenance will keep your brakes working

optimally, improve life of wearable parts and keep future maintenance to a minimum.

**ALWAYS** keep your brakes clean.

Cleaning minimizes the risk of contamination, removes dirt and debris that can cause reduced brake performance and decrease the life of consumable parts. It will also keep any corrosion to a minimum extending the life of the brake system. Avoid automotive disc brake cleaners for cleaning, look for disc brake friendly bike cleaners without silicon.

### 001\_EVERY RIDE

Before every ride, it's good to perform a few quick pre ride checks. Spotting any issues now could save you a lot of grief once you are on the trail. Check master cylinder for signs of damage, smooth operation, correct feel and no excessive lever travel.

- » Check brake lines for signs of damage or fluid leaks, check all connections are tight.
- » Check calipers for signs of damage or fluid leaks, check mounting bolts are tight
- » Check discs for signs of overheating or damage to the braking surface. Check for straightness, bent discs are a common reason for poor feeling brakes as they push caliper pistons back and give excessive lever travel.

See 'Rotor Tech Book' for more information on disc selection, condition and maintenance.

 [Link to Rotor Tech Book.](#)

### 002\_EVERY FIVE TO SIX RIDES

After a few rides your brakes will be properly bedded in and give you chance to assess your brake set-up and correct any issues. Check these in addition to your pre-ride checks.

- » Check caliper alignment, if something wasn't tightened correctly the braking forces during riding could cause the calipers to move.

See page 004 'Setting Up Your Brake'.

- » Check pad alignment, wheel/frame flex can cause the pistons to get pushed back unevenly in the caliper. Also as pads wear the pistons naturally adjust out at slightly different rates. A small in-balance in pad contact can have a massive impact on brake feel and performance so always keep them adjusted.

See page 004 'Setting Up Your Brake'.

- » Check pads, remove and look for excessive or uneven wear. This can indicate poor caliper or piston alignment. Put pads back in the same place in the caliper! Check the pad surface for glazing, this would indicate bad bedding in procedure or excessive heat. When pads material thickness is less than 0.5mm they need replacing.

See page 009 'Problem Solving' to help diagnose the cause of uneven wear

### 003\_EVERY 10 TO 12 RIDES

Over time, repeated heat cycles and environmental factors effect the efficiency of moving parts. Check these additional items after longer term use.

- » Lubricate Caliper Pistons, pistons may get dry over time and need some attention. This is particularly true with full phenolic type pistons, a lot less with a stainless-steel outer shell type pistons. Freely moving pistons are essential to maintain the correct level of piston retraction and avoid binding or excessive lever travel.

See page 009 'Problem Solving' for more detail.

- » Clean and lubricate M/C Piston, the rear section of the M/C piston that slides through the stop plate seal should be cleaned and lubricated so it moves freely though the seal. Only use silicon to lubricate, not WD40 or similar as it could contaminate the piston seals. Removing the lever and cam will help access to this area.

- » Check M/C pivot bearings/bushes ,remove the lever and cam (where applicable), clean and check bearings for smooth movement or check bushings for excessive wear. Replace as necessary.

### 004\_EVERY YEAR

If you have kept on top of regular maintenance then your brakes won't need any kind of major overhaul.

- » Brake Bleeding. Depending on the conditions and temperatures the brake fluid properties will deteriorate over time. It can be then advisable to replace the brake fluid. If the brake fluid appears to be dark brown it will need replacing, still clear brown then it's not necessary. You should not need to bleed brakes more than once a year assuming the brake was bled correctly in the first instance.

See page 004 'Setting Up Your Brake' for bleed instructions.

- » Check disc wear, minimum thickness is 1.5mm for all discs except vented which is 2.9mm.



**B**icycle hydraulic disc brakes are crucial for safe riding. However, they can sometimes be a source of annoying and potentially problematic noises. This guide provides technical insights and maintenance tips to help you understand and address noisy brake issues. It's important to recognize the type of noise your mountain bike brakes are producing.

### 001\_SQUEALING OR SCREECHING

**Description:** High-pitched and sharp noises.

**Cause:** Occurs due to vibrations between the brake pads and the rotor. Squealing often results from contamination of the brake pads or rotor by mud, dirt, water or oil. It can also occur due to uneven wear or glazed pads. On rainy conditions, it is caused by the heat of the brakes evaporating moisture from the rotors or brake pads. This noise should go away once the brakes heat up.

**Solution:** If pads have been contaminated, they will need replacing as oil will soak into the compound and cannot be removed. It's better news for the rotor though as they can be cleaned. We use methylated spirit to clean rotors as it dries off quickly and does not leave a residue, you can use disc cleaner (but do not overspray on caliper pistons or you could damage the seals). One 'pro tip' for cleaning brakes when you are out riding is to find some gritty mud and rub it onto the rotor, this can act as a mild grinding paste and can clean the contamination away when you don't have cleaners to hand. Consider using organic brake pads, which may be less prone to squealing.

### 002\_RATTLING

**Description:** A series of rapid, metallic sounds.

**Cause:** Rattling noises can stem from loose brake caliper components or a rotor that's not properly secured.

**Solution:** Ensure that all caliper bolts, including the mounting bolts, are securely

tightened. Check for play in the brake caliper and pads, adjusting as needed. Consider trying a different set of pads. It's also good practice to check that the wheel is properly fastened, hub bearing in good condition, headset bearings not loose.

### 003\_CHATTERING

**Description:** This noise resembles a rapid, irregular series of clicks or vibrations.

**Cause:** Chattering noises, can occur due to uneven, badly bedded in or contaminated brake pads. It can also occur from the pad moving under braking load.

**Solution:** The best way to bed new pads and rotors in is to ride around with the brake alternatively on and off (1-2s at the time) slightly for a few minutes. Then carry on, increasing the pressure each time. **Do not** build up excessive heat into the system. You'll feel the power increasing as you do. Once you have the brake feeling OK you can start to ride normally and should feel it reach full performance quite quickly. Uneven pad wear can come from poorly aligned pads and/or caliper. Check your setup. Keep your pads clean and replace them if contamination is persistent.

### 004\_HOWLING

**Description:** A continuous, low-frequency noise.

**Cause:** Howling or moaning can result from misaligned rotor and pads. It mainly occurs from highly contaminated brake pads with brake fluid or lubricant.

**Solution:** Realign the caliper and pads for proper alignment. Clean the rotor and replace the brake pads.

### 005\_PINGING OR CLICKING

**Description:** Quick, sharp, and repetitive sounds.

**Cause:** Clicking or pinging sounds might indicate a slightly bent or damaged rotor. If happening when stopped, especially with

floating discs, it's perfectly normal as the disc is just cooling down.

**Solution:** Consider rotor truing to straighten minor bends. Inspect for any damage to the rotor and replace if necessary.

### 006\_WHIRRING

**Description:** Continuous, high-pitched, whistling-like sounds, especially at high speeds.

**Cause:** Can result from rotor warping or pad irregularities. Common noise and shouldn't be consider as a major issue.

**Solution:** Inspect the rotor for warping and either true it or replace it. Ensure all rotor bolts are tightened securely. Replace the pads.

### 007\_RESONATING

**Description:** Resonating brakes produce prolonged or amplified noise often resulting in an irritating humming or droning sound. High-frequency vibrations may interact with other bike components, causing resonance.

**Cause:** Vibrations within the braking system. Each component in a bike's braking system has a natural frequency at which it naturally vibrates when subjected to external forces. When components within the brake system vibrate at or near their natural frequencies, it can lead to resonance, where vibrations are amplified and prolonged.

**Solution:** Consider using a disc or caliper with a different size to modify the natural frequency of the brake components, potentially reducing the likelihood of resonance.

If something isn't right with your brakes the first thing to do is sit back, make a brew and read this step-by-step guide to help you diagnose the issue. In the large majority of cases the problem will be something simple and easy to fix without major mechanical intervention.

### SECTION A: BASIC SET-UP

Always start with the basic setup, going step by step through the seven points below, most of which is covered in the 'Setting up your brake' section. Most problems stem from set-up and alignment issues, none of these operations require opening the brake system or bleeding the brake. If your brakes are not set-up correctly, they will always feel spongy and have excessive lever travel even if they are perfectly bled.

#### 001\_INITIAL EXAMINATION

Before you start delving any deeper give your brake system a thorough visual examination. You are looking for any obvious causes for the issue, i.e. damage, fluid leaks, just as you would check before any ride.

- >> Check master cylinder for signs of damage or fluid leaks. Smooth operation through the lever travel.
- >> Check brake lines for signs of damage or fluid leaks, check all connections are tight.
- >> Check calipers for signs of damage or fluid leaks, check mounting bolts are tight.
- >> Check brake discs. Check mounting bolts are tight, check for straightness/damage.
- >> Inspect the old pads thoroughly, the wear pattern can tell you a lot about brake set-up.



**FIG A:** A ridge left at the top of the pad shows that the wrong mount is used, and the caliper is sitting too high. Inversely a large unworn ridge on the outside of the disc shows the caliper is sitting too low. (More than 2mm)



**FIG B:** A pad worn on a taper lengthwise is evidence of a badly aligned caliper.



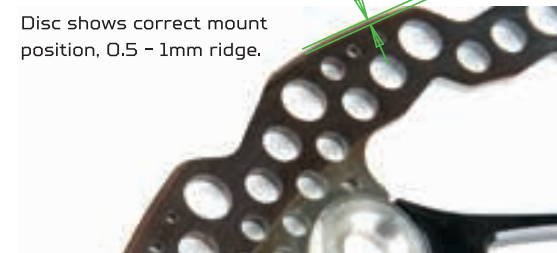
**FIG C:** A pad worn on a taper top to bottom is evidence of a warped disc.

**TIP:** Be careful when spraying your bike with lubricant, silicon spray, etc., they could contaminate your pads and disc

**Video:** How to change brake pads  
<https://vimeo.com/255878420>

#### 002\_CHECK BRAKE MOUNT

See 'Setting up your brake' section 001. Look at the wear mark on the disc, there should be 0.5mm to 1mm unworn near the top edge of the disc, [see picture](#). Any more means that the caliper is sitting too low. Less means that the caliper is sitting too high and you will see a tell-tale ridge worn on the pad, see FIG A.



#### 003\_CHECK CALIPER ALIGNMENT

See 'Setting up your brake' section 002. Even if the calipers were aligned well during initial installation a loose bolt or a knock on the trail may have caused something to move.

#### 004\_CHECK PAD ALIGNMENT

See 'Setting up your brake' section 003. Wheel/frame flex can cause the pistons to get pushed back unevenly in the caliper. Also, as the pads wear the pistons naturally adjust out at slightly different rates. A small in-balance in pad contact can have a massive impact on brake feel and performance. It's also a good opportunity to check that all the pistons are moving freely, you should be able to push them right back into the caliper housing and then they should pump out at a similar rate.

#### 005\_PISTON LUBRICATION

During step 004 if you notice any pistons are hard to move or the pads move back a long way from the disc when the brake lever is released, (a sign of too much piston retraction), then it helps to lubricate the pistons. Keeping the caliper pistons cleaned and lubricated ensures the correct amount of piston movement and maintains pad alignment.

#### LUBE PROCESS USING 3D PRINTABLE 'PISTON SERVICE TOOL'

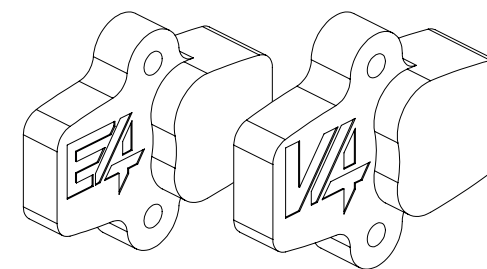
001\_Hold the bike in a bike stand and **remove the wheels.**

002\_Push the caliper pistons back into the caliper housing by pushing on the back of the pads with a flat blade screwdriver.

003\_Remove the brake pads from the caliper

004\_Install the 3D printable 'Piston Service Tool' into the caliper.

[Link to 3D printable tools.](#)



005\_Pump the brake lever which will allow one piston to move out until it contacts the tool.

006\_Remove the tool leaving the piston exposed **DO NOT** pull the brake lever at this point or the piston will be forced out of the caliper.

007\_Clean the piston with a dry cloth, avoid using brake cleaners which can contaminate the seals.

008\_Lubricate the exposed section of the piston with a small amount of silicon lubricant on a brush.

009\_Push the piston back into the caliper housing.

010\_Repeat the process for the other pistons, rotating the piston service tool as necessary.

011\_Re-install the wheels and pads.

012\_Pump the brake lever until the pads contact the disc and perform pad alignment process. Phenolic pistons require more care than stainless steel hybrid pistons. Use only silicon lubricant to lubricate pistons, **NO WD40, NO GT85.**

#### 006\_REPLACE THE PADS

Using a fresh set of pads will remove the possibility that poor feel comes from excessive or uneven pad wear and remove this from the equation. If the pad has less than 0.5mm of material remaining they will need replacing anyway.

#### 007\_CHECK DISC CONDITION

Check disc for wear and runout. **Minimum thickness** is 1.5mm for all discs except vented discs, (2.9mm). **Maximum runout** 0.2mm. Bent discs cause rubbing and will push the caliper pistons back into the caliper housing. This will result in excessive lever travel and inconsistent bite point. A slightly bent disc can be straightened using a disc rotor truing tool. Excessive disc wear can cause noise and poor lever feel. At worst it can lead to structural failure of the disc rotor.

- >> Check for glazing of the disc which can happen if a correct bedding in process is not followed, particularly with sintered brake pads.

**DO NOT** contaminate disc with fingers, always wear gloves when handling disc braking surfaces. Contaminated discs can be cleaned using methylated spirit, you can use disc cleaner (but do not overspray on to calipers or you could damage the seals). For more information on our disc rotors see the 'Disc Rotor Tech Book'

[Link to Disc Rotor Tech Book.](#)



### SECTION B: FURTHER OPERATIONS

Only proceed to section B if you have checked **all points in section A** and not diagnosed the issue. All these operations will require opening the brake system and a further brake bleed.

#### 001\_PERFORM BRAKE BLEED

See page 004 'Setting up your brake'.

Only bleed your brake once you are happy all basic set-up points in section A are spot-on. There is no point bleeding a brake that is not set-up correctly as it will always feel spongy and have excessive lever travel, making it hard to determine if the bleed has been completed correctly.

**TIP:** A good test to check if there is any air in your brake system is to hold the bike vertically on the back wheel or turn the bike completely upside down and repeatedly pull the brake lever. If the lever feel starts to feel spongy or the bite points moves closer to the handlebars, then there is still air in the system and the bleed process needs repeating.

#### 002\_REPLACE CALIPER PISTON SEALS

In some situations, caliper piston seals will need replacing.

**Look for the following symptoms:**

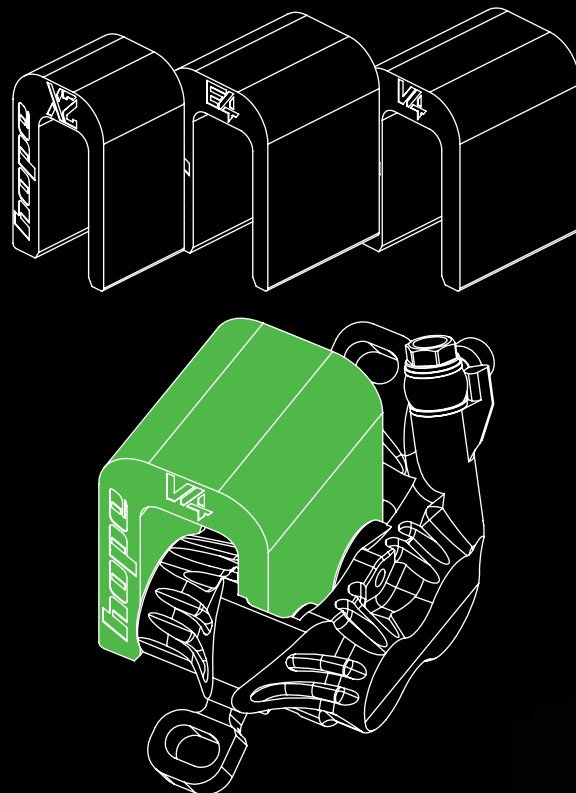
- » Well lubricated pistons that are stiff to move and don't retract anymore creating constant rub on the disc.
- » Well lubricated pistons that retract a lot, so the pads are sitting a long way from the disc surface even after pumping the pistons out and performing pad alignment.

#### REPLACEMENT PROCESS:

**001\_Hold the bike in a bike stand and remove the wheels.**

**002\_Remove the caliper from the frame/fork and let it hang down away from the bike.**

**003\_Place a container under the caliper to catch any fluid.**



**004\_Using the relevant piston service tool** hold the caliper pistons on the outside of the caliper (bore cap side). Pump the brake lever so the pistons on the inside of the caliper are forced out until they contact the tool. Remove the tool and gently remove the pistons.

**TIP:** Make a note of the orientation of the pistons before they are removed

**005\_Extract the bore caps using the correct tool**, as shown on the relevant exploded diagram, and push the other pistons out of the caliper.

**006\_Remove the seals using a 90 deg pick** and clean the caliper, making sure to clean out any debris from the seal grooves.

**007\_Examine the old seals and compare with the new ones.**

- » Swollen seals mean they have been contaminated (mineral oil, WD40 etc.)

- » If the seals don't lie flat on the bench it is likely they have been twisted in the groove.

- » If the square section of the seal is deformed then the seal has been overheated.

**008\_Lightly lubricate new seals with silicon lubricant** and carefully install them into the seal grooves. Make sure they are correctly seated and not twisted.

**009\_Re-install the pistons making sure the orientation is correct.**

**010\_Replace the bore cap o-ring seals and re-install into the caliper.** Torque settings are shown on the relevant exploded diagrams.

**011\_Clean the caliper and bleed the brake system.**

#### 003\_REPLACE MASTER CYLINDER PISTON SEALS

In some rare situations the master cylinder piston seals will need replacing.

**Look for the following symptoms:**

- » Pull the lever hard and keep it held at the same static force. The lever will slowly move further inwards towards the handlebar.

This can be hard to diagnose as a poor brake bleed or other fluid leak can cause almost identical symptoms hence it can only be checked after all other diagnostic steps have been completed.

#### REPLACEMENT PROCESS:

**001\_Remove the lever and cam** (where applicable).

**002\_Remove the stop plate M3 screw** with a T10 security driver.

**003\_Pull the M/C piston out from the bore.**

**004\_Carefully clean the piston and M/C.**

**005\_Inspect the seals on the piston for any damage**, inspect the M/C bore for any debris or damage.

**006\_Lightly lubricate the seals on the replacement piston** and install into the M/C bore.

**007\_Re-install the stop plate and lever.**

**008\_Bleed the brake system.**



BRAKE

TROUBLE SHOOTING

SYMPTOM	POTENTIAL CAUSE	SOLUTION	✓
Soft lever feel.	Poor caliper alignment.	Set caliper alignment.	
	Poor pad alignment.	Re-centre caliper pistons/pads.	
	Uneven pad wear.	Replace pads.	
	Something loose.	Check and re-torque all bolts.	
	Air in the brake system.	Bleed the brake system.	
Excessive or inconsistent lever travel.	Poor caliper alignment.	Set caliper alignment.	
	Poor pad alignment.	Re-centre caliper pistons/pads.	
	Uneven piston retraction.	Clean and lubricate pistons. Check caliper seal for damage/seated in groove.	
	Something loose.	Check and re-torque all bolts.	
	Bent disc rotor.	Straighten or replace disc.	
	Air in the brake system.	Bleed the brake system.	
Lever comes to bars always.	Air in the brake system.	Bleed the brake system.	
Lever comes to bars sometimes.	Air in the brake system. Old brake fluid.	Bleed the brake system. Re-bleed with new fluid.	
Lever comes to bars when bike turned upside down.	Air in the brake system.	Bleed the brake system.	
Lever slowly comes to bars when pulling hard.	Fluid leak.	Check all connections, hose for damage, around caliper and M/C for any signs of fluid.	
	Air in the brake system.	Bleed the brake system	
	Primary seal worn or failed.	Replace M/C seals.	
Lever slowly moves away from bars during long braking events.	BPC adjusted too far in.	Back off BPC adjuster 0.5 turns anti-clockwise.	
	Fluid overfill.	Re-bleed brakes making sure to push caliper pistons back before topping up reservoir.	
	Old brake fluid.	Re-bleed with new fluid.	
Low power.	Pad contamination.	Replace with new pads, clean disc.	
	Disc contamination.	Fit new pads, clean disc.	
	Glazed pads.	Replace with new pads.	
	Glazed disc.	Fit new pads and perform extended bedding process.	

SYMPTOM	POTENTIAL CAUSE	SOLUTION	✓
Brakes rubbing/binding.	Caliper piston stuck/stiff	Clean and lubricate pistons with silicone lubricant.	
	Bent disc rotor.	Straighten or replace disc.	
	Fluid overfill.	Re-bleed brakes making sure to push caliper pistons back before topping up reservoir.	
	Old brake fluid.	Re-bleed with new fluid.	
Lever hard to pull.	Restriction in hose.	Remove hose and check for any restriction, replace if necessary.	
	System contaminated with mineral oil.	Flush out all oil and replace all rubber seals.	
	Something broken or stuck in lever mechanism.	Remove M/C from brake and check for free movement of lever, replace parts as necessary	
Lever slow to return.	Pivot bearings/bushings worn.	Replace bearings/bushings.	
	Dust cover dirty/contaminated.	Remove cover, clean, lubricate and replace with new seal.	
	Something broken or stuck in lever mechanism.	Remove M/C from brake and check for free movement of lever, replace if necessary.	
	System contaminated with mineral oil	Flush out all oil and replace all rubber seals.	
Noisy/squeaky.	Pad contamination.	Replace with new pads, clean disc.	
	Disc contamination.	Replace with new pads, clean disc.	
	Poor caliper alignment.	Face caliper frame mounting points. Check brake adapters are straight.	
	Loose mounting bolts.	Check and re-torque all bolts.	
Vibration.	Something loose.	Check and re-torque all bolts.	
	Warped disc rotor.	Replace rotor.	



### WHICH BRAKE FLUID?

Imagine there was a fluid, specifically formulated for use in braking systems. Engineered to provide high wet or dry boiling points, increase safety, increase performance particularly at the extremes of temperature, extend service life and limit corrosion. All produced to the same strict standards and readily available all over the world. The reality is that this has already been developed and is called DOT brake fluid. a glycol-ether based fluid. This was adopted by the automotive industry in the 1960's, before this they used a mixture of oil based hydraulic fluids and alcohols.

Our brake systems use DOT 5.1 brake fluid, as used in the highest-level motorsport.

### SO WHY IS DOT GOOD?

DOT fluid is specially engineered to be hygroscopic; this means the fluid absorbs water. Over time moisture finds its way into any brake system, in a DOT fluid system this mixes with the brake fluid and gradually lowers the boiling point of the fluid, meaning your brakes performance remains high over a long period of time and extends the service interval of the brake, when was the last time your car had its brakes bled? It also means any moisture is dispersed through the fluid rather than gathering in a localised area, limiting corrosion, and extending the life of the entire brake system. This property also means only water is needed to clean it up.



DOT Fluid when mixed with water

Another advantage of using DOT in bicycle brakes is the seal material. DOT compatible rubbers benefit from many years development in automotive and motorsport applications, these advanced

rubber compounds have a wider functional temperature window, i.e. your brake will have higher performance and be more reliable at both high and low temperatures. The seals will maintain their mechanical properties and are less likely to degrade during extreme use.

Availability and standardisation are a major bonus of DOT fluid. All fluid must be produced to strict standards so whatever fluid you buy you know you are getting the same performance in terms of boiling point and viscosity, vital to maintain the performance of your brake. No 'special' fluid requirements needed!

### WHY NOT USE MINERAL OIL?

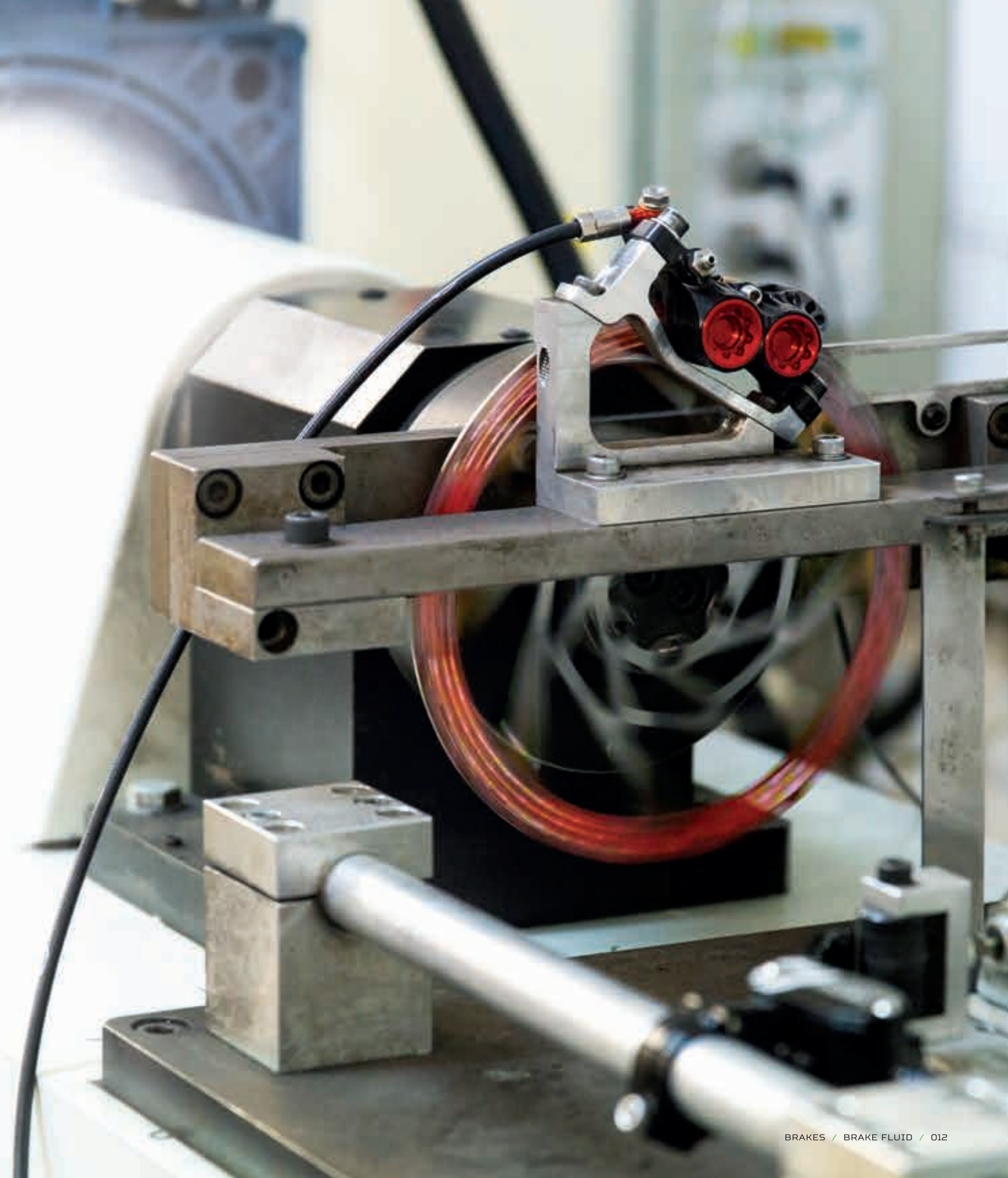
There is a property of mineral oil, when it comes to use in a bicycle brake, that causes an issue. While the dry boiling point can be very high on some mineral oils the boiling point of the braking system is reduced significantly as soon as any moisture gets into the system. The environment bicycles are used and stored in means moisture tends finds a way in. Mineral oil is hydrophobic (doesn't mix with water) meaning any moisture gathers in the system as a pocket of water which can easily boil giving inconsistent brake performance and at worst total brake failure.

In our experience a mineral oil system requires more maintenance and has reduced performance and reliability during hard use.



Mineral oil when mixed with water

In summary, brake performance is about more than just the fluid used, however we believe we can make a higher performing and longer lasting brake using DOT 5.1 fluid.







## FAQ'S

### MY BRAKES ARE NOISY, WHAT SHOULD I DO?

See page 008 “Noisy Brakes” section of this document.

### HOW OFTEN DO I NEED TO BLEED MY BRAKES?

If you haven't bled your brakes in a couple of years or have opened the system (maybe to cut the hose, or thread it through an internally routed frame), a brake bleed may be beneficial. See page 006 “Bleeding your brake”. You shouldn't have to bleed your brake system more than once a year, regardless of use.

### HOW DO I BED IN MY BRAKES PADS?

To bed in the pads, ride at a moderate speed, rolling down a gentle slope is perfect. Gently apply the brake without attempting to fully stop and then release. Let the bike get up to speed again, this allows time for cooling and prevents too much heat buildup, repeat several times. You should be able to feel the brake power increasing with every stop, end the procedure when you achieve good braking performance. Sintered pads take longer to bed in than organic pads, a general rule is that the more durable the pad compound is, the longer it will take to bed in. The brake will reach its full potential after a few rides..

### WHAT BRAKE FLUID TO USE?

All Hope Technology brakes use DOT5.1 (or DOT4) brake fluid. Except RX4+ Mineral.

### WHY HOPE TECHNOLOGY IS USING DOT BRAKE FLUID?

See page 012 “Brake Fluid”.

### HOW OFTEN SHOULD I LUBRICATE THE CALIPER PISTONS?

For the older phenolic pistons we recommend lubricating them every time you change the pads. This only takes a few minutes and the pads are already removed so it's a good time to do it. For hybrid type pistons every 12 month should be more than enough. See page 009 “Problem Solving”.

### WHAT DISC TYPE AND SIZE DO I NEED TO USE?

 [Link to Disc Rotor Tech Book.](#)

### WHAT SORT OF PADS SHOULD I USE?

 [Link to Brake Pad Usage Guide.](#)

### SHOULD I USE STANDARD OR BRAIDED HOSE?

The braided hose will be less prone to be damage when the bike is transported or handled. The overall brake performance will be the same using either hose. Burst pressure of braided hose is superior than the black hose but far beyond anything achievable by pulling the brake lever by hand.

### WHY DO THE CALIPER PISTONS MOVE AT A DIFFERENT RATE?

When the brake is applied and brake fluid enters the caliper the piston with the least resistance will move first, then the second piston and so on. It is normal that the pistons don't move in a synchronised manner.

## MISCONCEPTIONS

### “MY BRAKE DOESN'T FEEL RIGHT, IT NEEDS BLEEDING”

**NO**, this is the biggest misconception in the bike industry where brakes are bled far too often. You need to ask yourself if the brake really needs bleeding. Thinking about it, automotive vehicles are all using hydraulic brakes based on the same technology and do you ever think to take your car to the garage to bleed the brakes? We reckon that in most cases poor brake feel is a consequence of bad brake setup rather than been related to brake bleed. If your brakes were previously performing well, we recommend that you run through the caliper and pad alignment checks first. There's definitely no need to bleed your brakes after each race run.

### “MY PADS ARE CONTAMINATED, I'LL BOIL THEM TO CLEAN THEM!”

We recommend adding a pinch of salt and rosemary as you do! **NO**, we are afraid that contaminated pads just need replacing. Full stop. The disc must be cleaned with disc cleaner.

### “MY CALIPER PISTONS ARE RETRACTING TOO MUCH, IT NEEDS MORE FLUID!”

**NO**, adding more fluid won't reduce piston retraction. Only lubricating pistons or replacing caliper piston seals will have an influence on piston retraction. The volume of brake fluid has no link whatsoever with piston retraction unless the system is closed. If you overfill the system there is a high risk of your brake binding and even fully locking on during use.

### “IT IS BEST TO USE MINERAL OIL, IT MAKES A BETTER BRAKE”

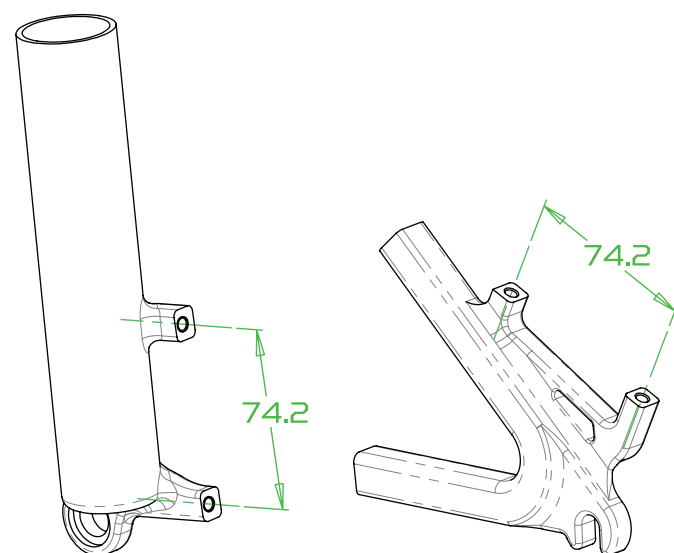
**NO**, the brake fluid is just there as a means to transfer the force from the master cylinder to the caliper, like a cable will do. Mineral oil or DOT fluid is like using two different materials for the cable but they serve the same purpose. Both fluid types have pros and cons, see page 012 “Brake Fluid”. Hope brakes, like all high performance motorsport brakes, use DOT5.1 brake fluid.

### “MY BRAKES ARE NOISY I AM GOING TO APPLY ANTI SQUEAL PASTE TO THE PADS”

**NO**, this paste will melt during use and contaminate the disc and pads.

# 「SUPPORTING DOCUMENTS」

CHARTS AND EXPLODED DIAGRAMS

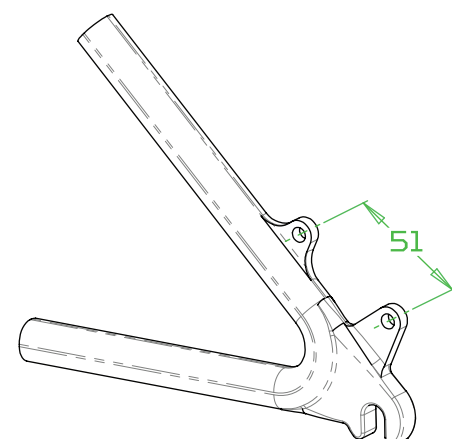


FORK OR FRAME MOUNT TYPE:

**POST MOUNT**

M6 Threaded holes x2

Many variations: See Warning at the bottom

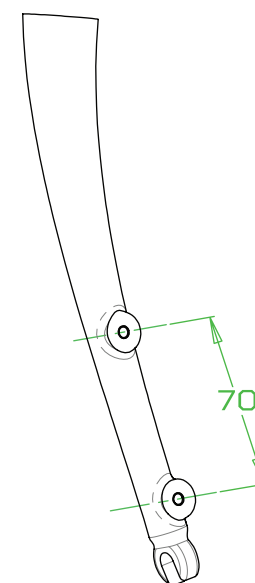


FORK OR FRAME MOUNT TYPE:

**IS - INTERNATIONAL STANDARD**

Ø6mm Holes x2

Two variations: IS Front and IS Rear

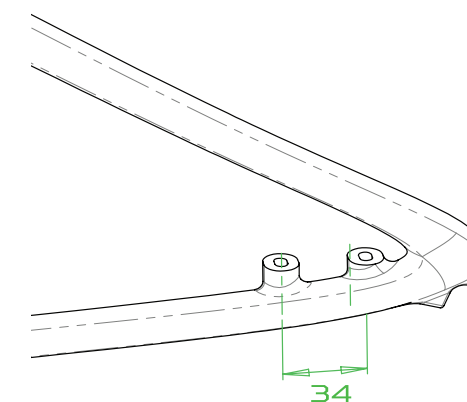


FORK OR FRAME MOUNT TYPE:

**FLAT MOUNT FRONT**

M5 Threaded holes x2

Two variations: F140/160 and F160/180



FORK OR FRAME MOUNT TYPE:

**FLAT MOUNT REAR**

Oblong holes for M5 screw x2

Two variations: R140/160 and R160/180

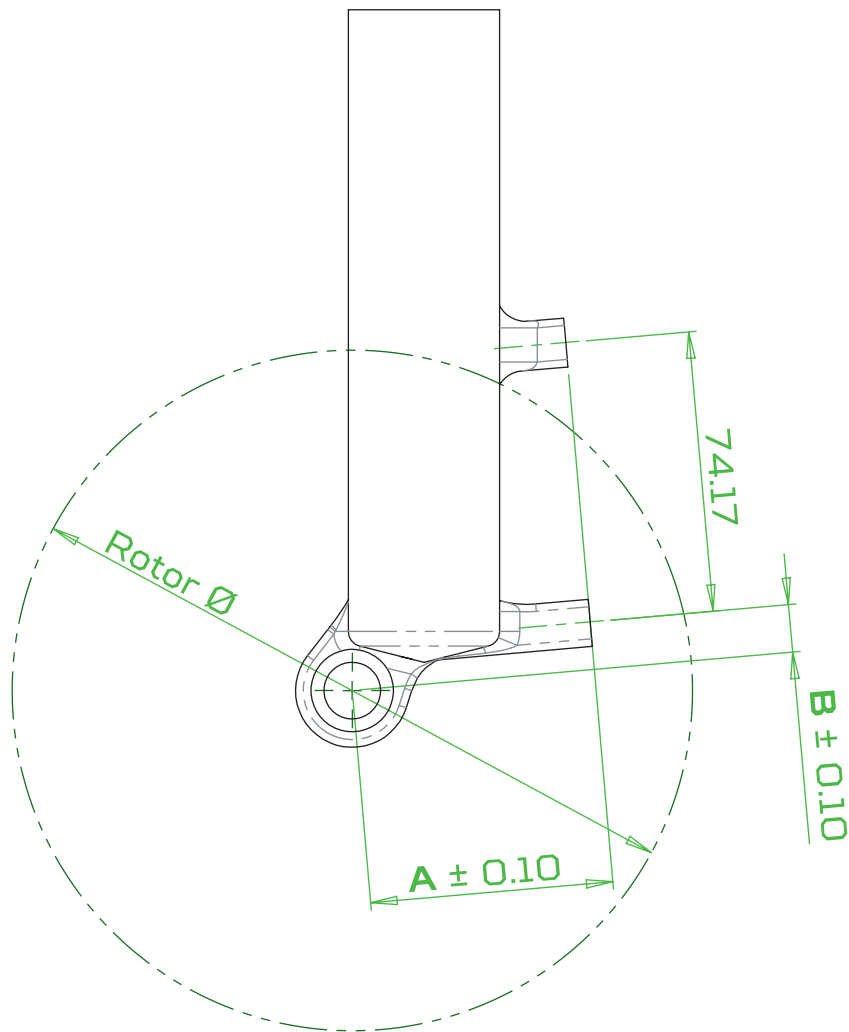


**NOTE:**

Post Mount tab position varies so it will work with different size disc from Ø140mm to Ø203mm. Post Mount is very common on MTB forks and at the back of most MTB frames.

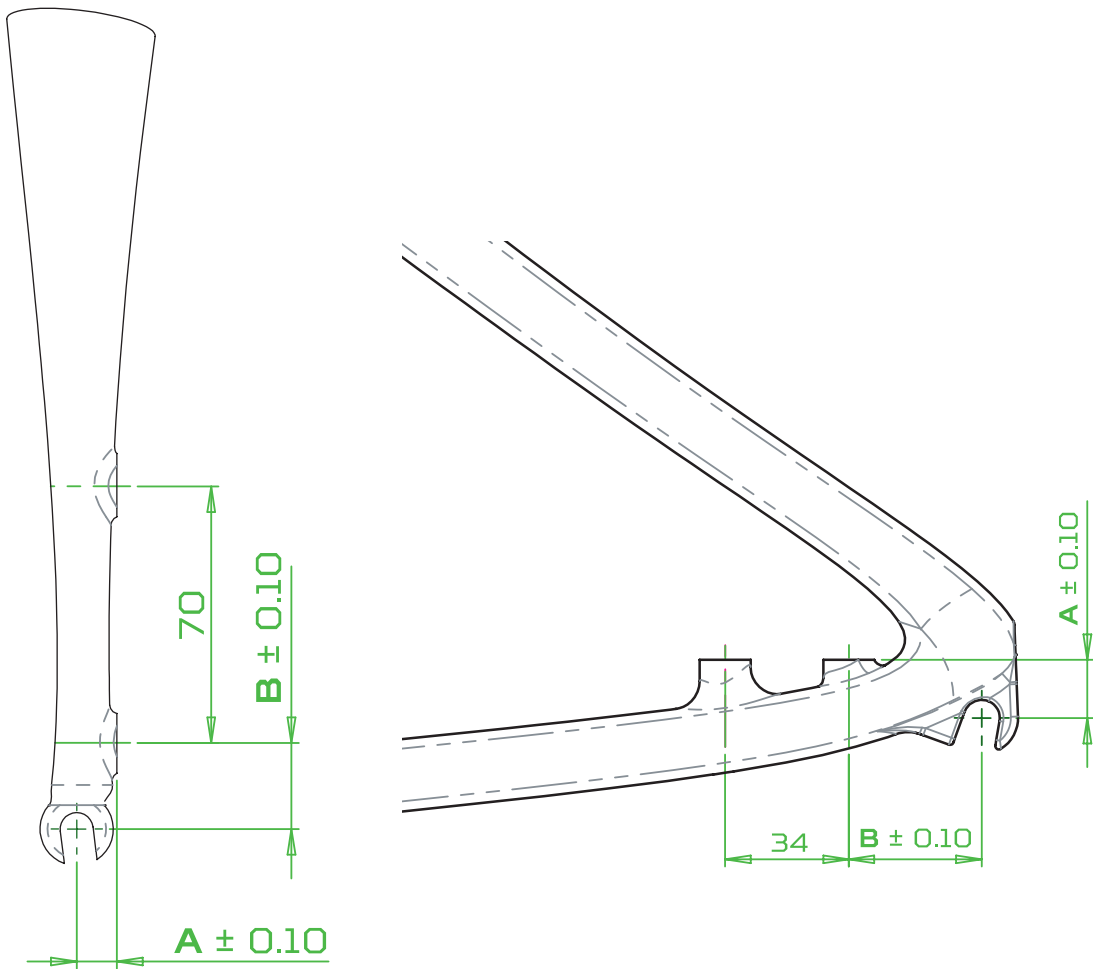
IS can still be found on old forks but more common on frames (IS rear).

Flat Mount is a Road and Gravel bicycle standard.



FRONT: POST MOUNT

POST MOUNT Specification		
Rotor Dia. [mm]	A Dimension [mm]	B Dimension [mm]
Ø140	47.5	1.7
Ø160	55.9	7.1
Ø180	64.3	12.6
Ø200	72.7	18



FRONT: FLAT MOUNT

REAR: FLAT MOUNT

FLAT MOUNT Specification		
	A Dimension [mm]	B Dimension [mm]
Front F140/160	11	23.5
Front F160/180	16.7	32
Rear F140/160	16	36.5
Rear F160/180	21.3	45

**NOTE:** Sometimes the rear type mounts can be found on front forks!



**NOTE:**

A Standard Post Mount caliper will fit directly on the forks or frame using the corresponding rotor diameter. If you wish to use a larger rotor, you'll have to use a brake mount adaptor.

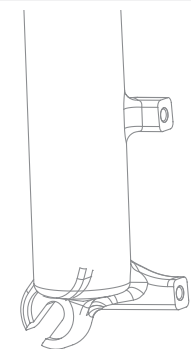
See brake mount chart.

There is a specific chart for the fitting of Hope RX4+ calipers on Flat Mounts.

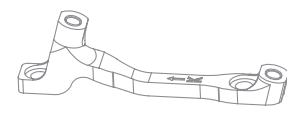


# BRAKE ADAPTOR MOUNTS

FORK OR FRAME MOUNT TYPE:  
**POST MOUNT**

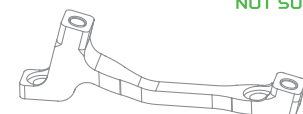


HBMK  
**NOT SUITABLE FOR**  
V2 / Mono6



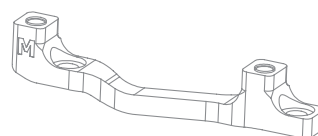
**K** Post Mount 140 > Post Mount 160mm

HBML  
**NOT SUITABLE FOR**  
Mono6



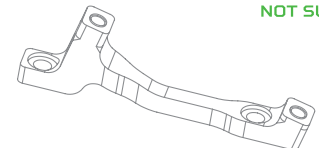
**L** Post Mount 160 > Post Mount 180mm  
Post Mount 180 > Post Mount 200mm

HBMM



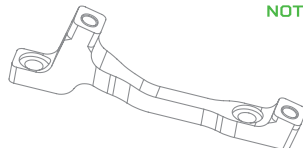
**M** Post Mount 160 > Post Mount 200mm  
Post Mount 180 > Post Mount 220mm

HBMP  
**NOT SUITABLE FOR**  
Mono6



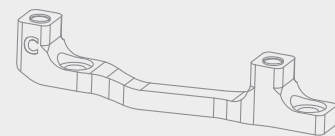
**P** Post Mount 200 > Post Mount 220mm

HBMQ  
**NOT SUITABLE FOR**  
V2




**Q** Post Mount 203 > Post Mount 220mm

HBMC



**C** Post Mount 160 > Post Mount 203mm

HBMH

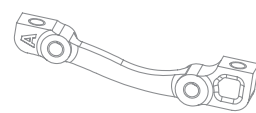


**H** Post Mount 160 > Post Mount 183mm  
Post Mount 180 > Post Mount 203mm

FORK OR FRAME MOUNT TYPE:  
**INTERNATIONAL STANDARD [IS]**

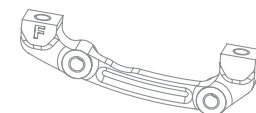


HBMA  
Fits MonoMini and X2 calipers **ONLY**



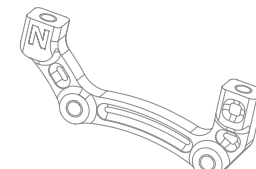
**A** IS Front > Post Mount 160mm  
IS Rear > Post Mount 140mm

HBMF  
**NOT SUITABLE FOR**  
Mono6



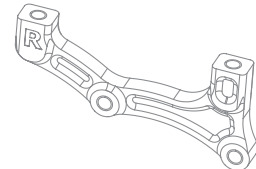
**F** IS Front > Post Mount 180mm  
IS Rear > Post Mount 160mm

HBMN



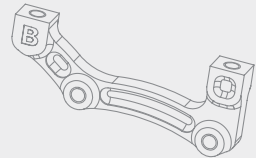
**N** IS Front > Post Mount 200mm  
IS Rear > Post Mount 180mm

HBMR



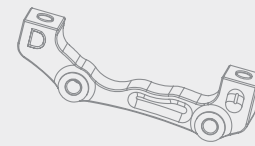
**R** IS Front > Post Mount 220mm  
IS Rear > Post Mount 200mm

HBMB



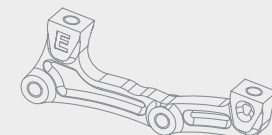
**B** IS Front > Post Mount 203mm  
IS Rear > Post Mount 183mm

HBMD



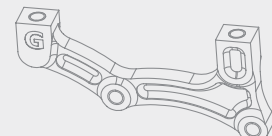
**D** Boxxer > Post Mount 203mm  
Pre 2009 forks only

HBME



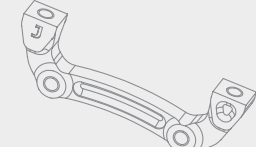
**E** FOX40 > Post Mount 203mm  
Pre 2014 forks only

HBMG



**G** IS Rear > Post Mount 203mm

HBMJ



**J** IS Front > Post Mount 183mm

**NOTE:** 180, 183, 185, 200, 203 dia.

Over the years there has been some confusion over this "middle" sized disc. Although we will continue to manufacture 183mm discs and their corresponding H and J mounts, we have decided to standardise on the more common 180mm disc size.

**NOTE:** Post Mount tab position varies depending on the manufacturers intended minimum disc size.

Please contact the fork or frame manufacturer to identify the Post Mount standard being used.

## FUTURE PROOFING:

For future proof assemblies preferably use the following disc sizes:  
140 / 160 / 180 / 200 / 220

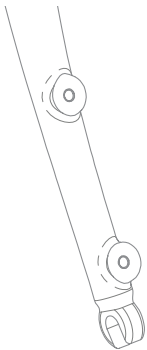
☐ Recommended for modern braking systems

☐ Less common applications



BRAKE ADAPTOR  
MOUNTS

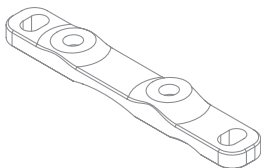
FORK OR FRAME MOUNT TYPE:  
**FLAT MOUNT FRONT**  
F140/160



**Z**

Flat Mount Front > 160mm

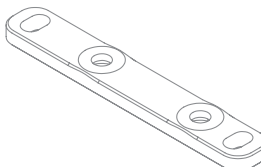
HBMZ



**X**

Flat Mount Front > Flat Mount 140mm

HBMX

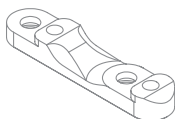


FORK OR FRAME MOUNT TYPE:  
**FLAT MOUNT REAR**  
R140/160

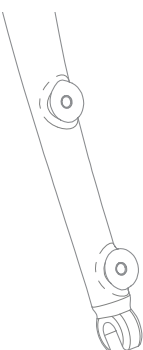
**Y**

Flat Mount Rear > Flat Mount 160mm

HBMY



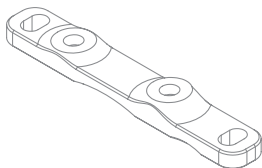
FORK OR FRAME MOUNT TYPE:  
**FLAT MOUNT FRONT**  
F160/180



**Z**

Flat Mount Front > Flat Mount 180mm

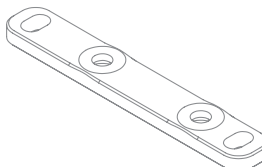
HBMZ



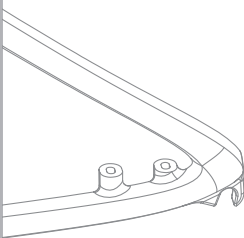
**X**

Flat Mount Front > Flat Mount 160mm

HBMX



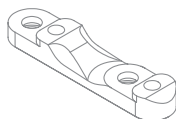
FORK OR FRAME MOUNT TYPE:  
**FLAT MOUNT REAR**  
R160/180



**Y**

Flat Mount Rear > Flat Mount 180mm

HBMY





# TECH 4 MASTER CYLINDER ASSEMBLY

Tech 4 Lid  
HBSP424

Tech 4 Master  
Cylinder Body  
HBSP420  
Clamp Bolt  
M516AL



Hinge Clamp  
HBSP401

Tech 4 Master  
Cylinder Spring  
HBSP386

18mm Grooved Pin  
HBSP387

Spring Top Hat  
HBSP412

Tech 4 Primary Seal  
HBSP408

Tech 4 Master  
Cylinder Piston  
HBSP423

Dome Head  
Screw  
M3 x 6

Stop Plate  
HBSP326

Piston Insert  
HBSP272

Tech 4 Secondary Seal  
HBSP430

Tech 4 Piston Guide Bush  
HBSP407

Tech 4 Lever Blade  
HBSP421

Tech 4 Pivot Bolt  
HBSP425

Dome Head Screw  
M3 x 8



Tech 4 Diaphragm  
HBSP405

Tech 4 Deflector Plate  
HBSP406

M6 Sealing Washer  
HBSP026

Straight Connector  
HBSP163



Tech 4 Pivot  
Bearing x 2  
S6842R5

Tech 4 Pivot Nut  
HBSP428

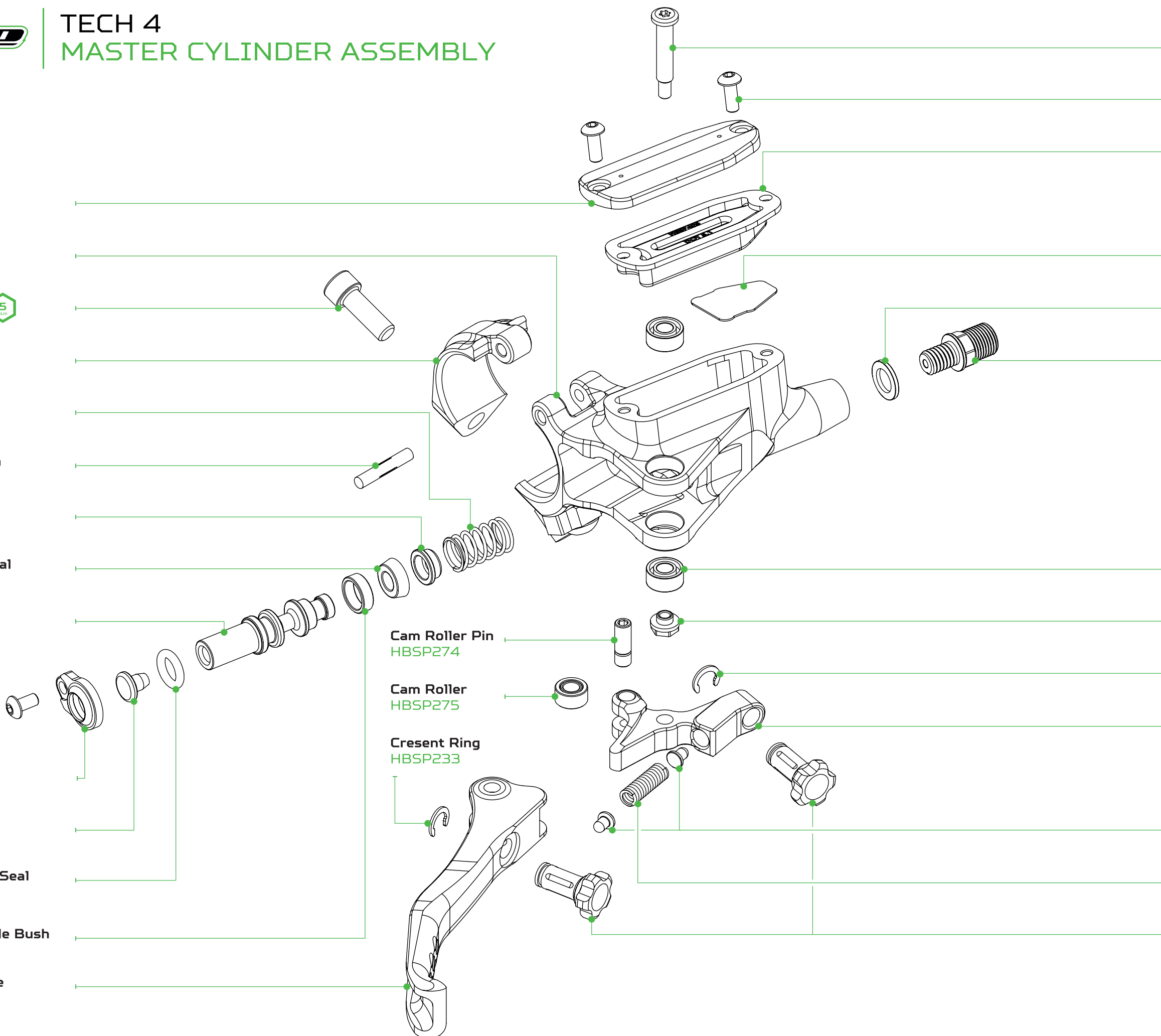
Crescent Ring  
HBSP233

Tech 4 Cam  
HBSP422

Brass Plunger x 2  
HBSP319

Lever Spring  
HBSP312

Adjuster Screw x 2  
HBSP219





# XCR MASTER CYLINDER ASSEMBLY

XCR Lid  
HBSP399

Tech3 Diaphragm  
HBSP309

Tech3 Deflector Plate  
HBSP310

Hinge Clamp  
HBSP401

M5x16 Alloy  
Cap Screw  
HBSP258

18mm Grooved Pin  
HBSP387

XCR Master  
Cylinder Body  
HBSP400

Tech 4 Master  
Cylinder Spring  
HBSP386

XCR Flanged Bush  
HBSP389

Race Pivot Circlip  
HBSP269

Spring Top Hat  
HBSP412

Piston Guide x2  
HBSP409

Piston  
HBSP397

M3x8 Dome  
Head Screw x 2



Race Lever Pivot  
HBSP257

Mini Primary Piston  
Seal  
HBSP109

Mini Secondary  
Piston Seal  
HBSP108

1/2" Internal Circlip  
HBSP388

M3x8 Dome  
Head Screw

Lever Blade Barrel  
HBSP398

Lever Barrel Spring  
HBSP390

Lever Barrel Bush  
HBSP391

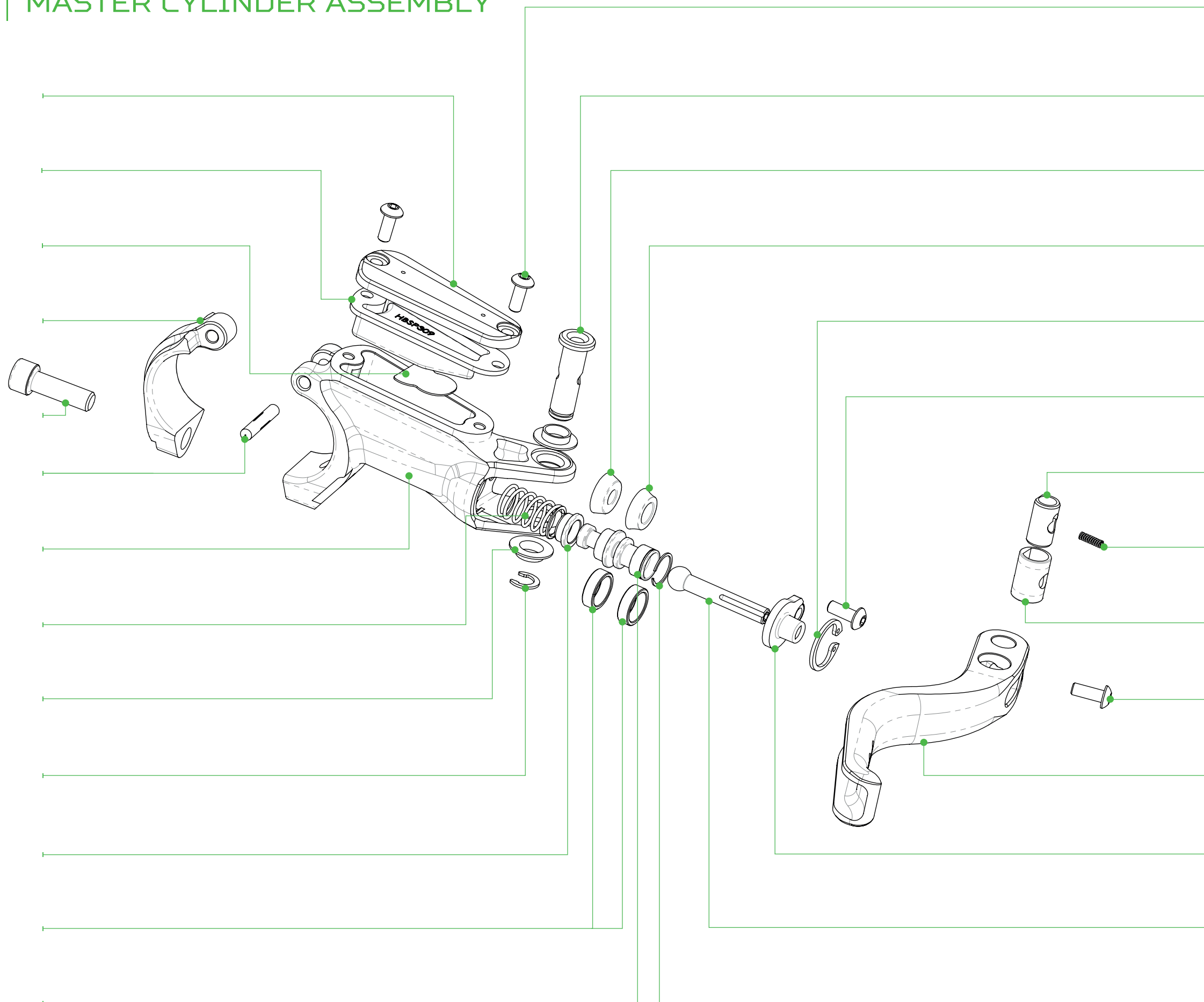
M3x8 Dome  
Head Screw

XCR Carbon Lever Blade  
HBSP411  
XCR Aluminium Blade  
HBSP396

Race Evo Stop Plate  
HBSP279

Ball End Adjuster  
HBSP395

Guide Clip  
XVSM-8







# TECH3 DUO MASTER CYLINDER ASSEMBLY

Tech 3 Duo Master  
Cylinder Body  
HBSP381

M6 Sealing Washer x2  
HBSP26

Straight  
Connector x2  
HBSP163

Tech 3 Deflector Plate x2  
HBSP310

Tech 3 Diaphragm  
HBSP309

Tech 3 Lid x2  
HBSP315

Dome Head  
Screw x4  
M3x8



Flange Bush x4  
HBSP313

Tech 3 Lever Cam x2  
HBSP318

Tech Adjuster Screw x4  
HBSP219

Tech 3 Lever Spring x2  
HBSP312

Tech 3 Brass Plunger x4  
HBSP319

Tech Cam Grub Screw  
**LONG LEVER ONLY**  
HBSP230  
Crescent Ring x4  
HBSP233

Pivot Circlip  
HBSP311

Tech Evo Cam Roller x2  
HBSP275

Tech Evo Cam Bush x2  
HBSP276

Tech Evo Cam Roller Pin x2  
HBSP274

Tech 3 Duo Pivot  
HBSP382

Tech 3 Clamp  
HBSP316

Alloy Cap Screw x2  
M5 x 16 HBSP258



Tech Piston Spring x2  
HBSP231

Mini Primary  
Piston Seal x2  
HBSP109

Mini Secondary  
Piston Seal x2  
HBSP108

Tech 3 Piston x2  
HBSP317

Tech 3 Evo  
Piston Insert x2  
HBSP272

Dome Head Screw x2  
M3x6

Tech 3 Stop Plate x2  
HBSP326

Tech 3 Lever and Cam  
Sub Assembly

Tech 3 Duo  
S Shape Lever  
Right: HBSP383:R  
Left: HBSP383:L



## X2 POST MOUNT CALIPER ASSEMBLY

Connector Bolt  
HBSP047



Bleed Nipple  
HBSP238



Bleed Nipple O'Ring  
HBSP239

Rubber Cap  
HBSP240

Pad Pin  
HBSP204



Bore Cap O'Ring  
HBSP244

Bore Cap  
HBSP243



LH Drive

Bore Cap Tool  
HTTC-TC  
NOT TO SCALE

M6 Sealing Washer x2  
HBSP026

90° Connector  
HBSP162

Brake Pad (pair)  
HBSP237

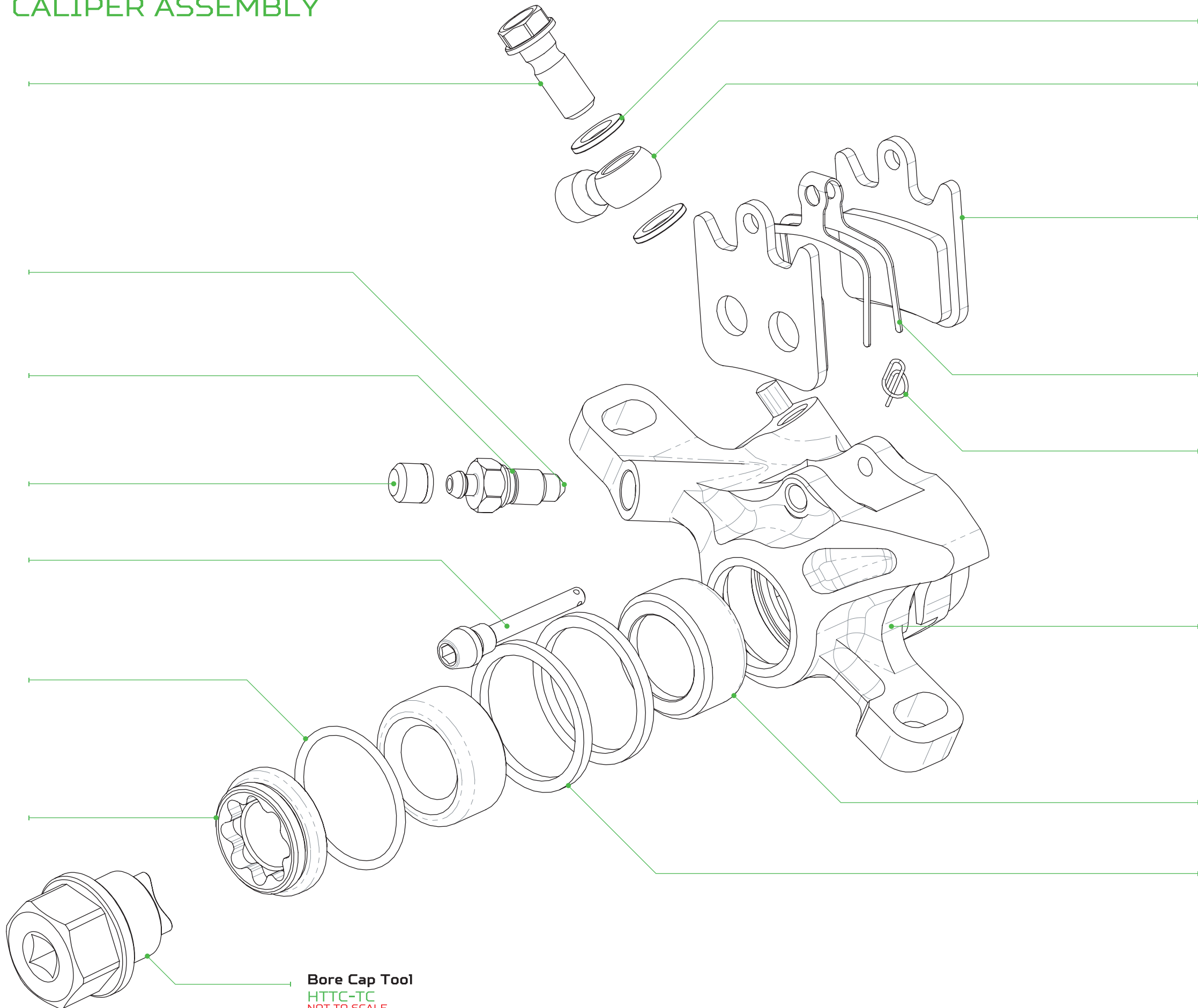
Brake Pad Spring  
HBSP202

Pad Pin R Clip  
HBSP171

Caliper Body  
HBSP234

Piston x2  
HBSP235

Piston Seal x2  
HBSP236





## X2 FLAT MOUNT CALIPER ASSEMBLY

Bleed Nipple O'Ring  
HBSP239

Bleed Nipple  
HBSP238

Rubber Cap  
HBSP240

Pad Pin  
HBSP204

4  
Num

Bore Cap O'Ring  
HBSP244

Bore Cap  
HBSP243

10  
Num

Bore Cap Tool  
HTTC-TC  
NOT TO SCALE

Brake Pad (pair)  
HBSP237

Brake Pad Spring  
HBSP202

Pad Pin R Clip  
HBSP171

X2 Caliper Body  
Flat Mount  
HBSP380

Piston Seal x2  
HBSP236

M5x12  
Countersink x2  
M512CS  
IF USED WITH BRAKE MOUNT

Piston x2  
HBSP235



# TECH E4 CALIPER ASSEMBLY

Connector Bolt  
HBSP047



Bleed Nipple O'Ring  
HBSP239

Bleed Nipple  
HBSP238



Rubber Cap  
HBSP240

Pad Pin  
HBSP204



E4 Bore Cap O'Ring x2  
HBSP140

E4 Bore Cap x2  
HBSP302



Bore Cap Tool  
HTTC-TC  
NOT TO SCALE

M6 Sealing Washer x2  
HBSP026

90° Connector  
HBSP162

E4 Brake Pad (pair)  
HBSP323

Pad Spring  
HBSP142

Pad Pin R Clip  
HBSP171

E4 Caliper Body  
HBSP324

E4 Piston Seal x4  
HBSP068

E4 Piston x4  
HBSP136



# TECH V4 CALIPER ASSEMBLY

Connector Bolt  
HBSP047



Bleed Nipple O'Ring  
HBSP239

Bleed Nipple  
HBSP238



Rubber Cap  
HBSP240

Pad Pin  
HBSP204

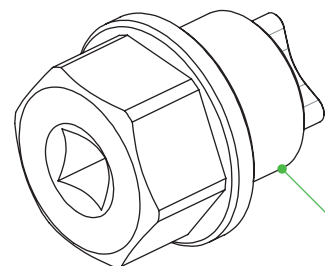


V4 Large Piston x2  
HBSP298

V4 Large Piston Seal x2  
HBSP299

V4 Large Bore  
Cap O'Ring  
HBSP301

V4 Large Bore Cap  
HBSP300



Bore Cap Tool  
HTTC-TC  
NOT TO SCALE

M6 Sealing Washer x2  
HBSP026

90° Connector  
HBSP162

V4 Brake Pad (pair)  
HBSP303

V4 Brake Pad Spring  
HBSP304

Pad Pin R Clip  
HBSP171

V4 Caliper Body  
HBSP297

V4 Small Piston  
Seal x2  
HBSP068

V4 Small Piston x2  
HBSP136

V4 Small Bore  
Cap O'Ring  
HBSP140

V4 Small Bore Cap  
HBSP302





RX4+ DOT4 OR DOT5.1  
CALIPER ASSEMBLY

M5 Bleed Nipple  
HBSP339



Large Piston x2  
HBSP136

Large Piston Seal x2  
HBSP68

Pad Pin  
HBSP204



Large Bore Cap O'Ring  
HBSP140

Large Bore Cap  
HBSP419



Small Bore Cap  
HBSP418



Pad Spring  
HBSP142

Brake Pad (pair)  
HBSP323

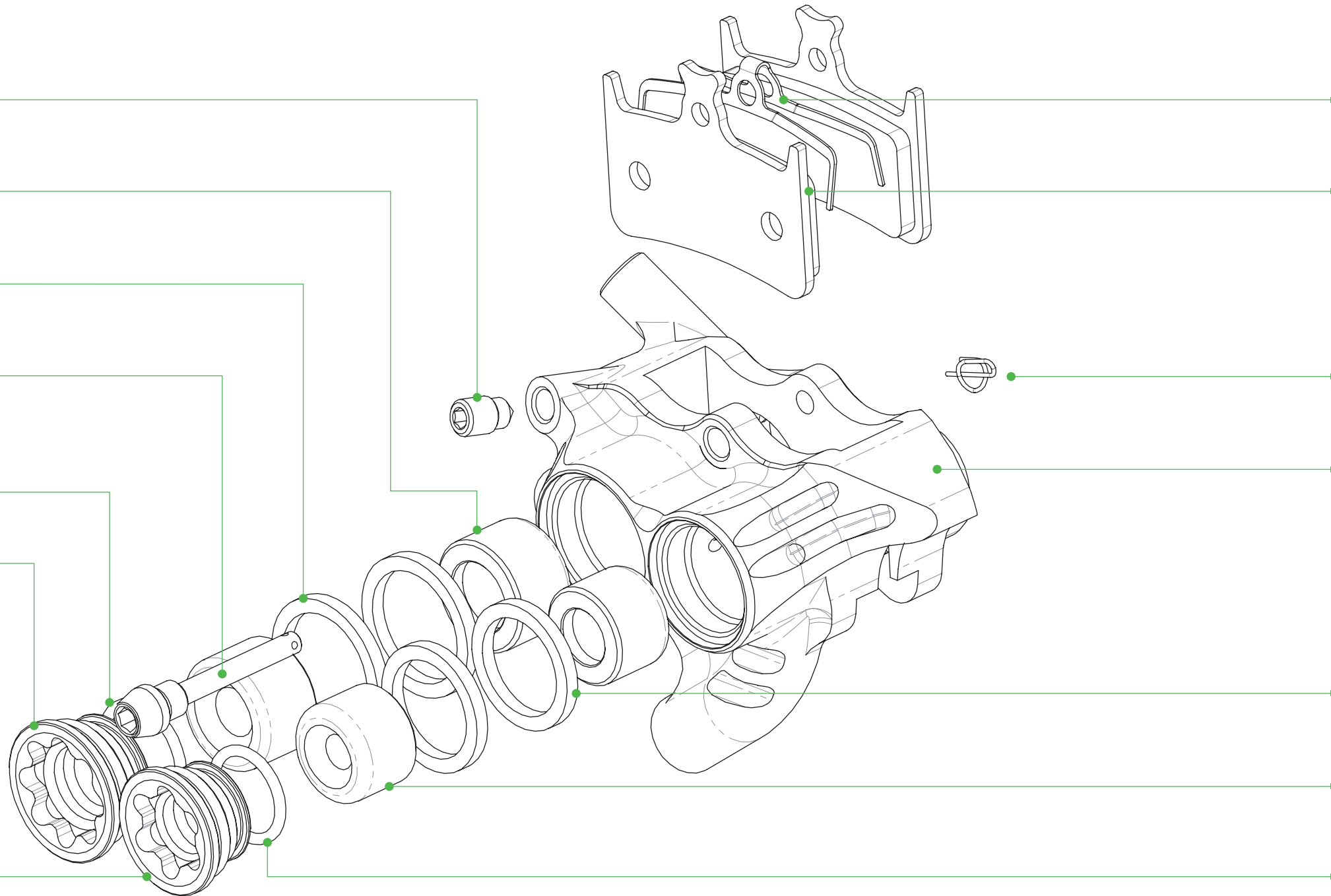
Pad Pin R Clip  
HBSP171

RX4+ Caliper  
Body FM+20  
HBSP417

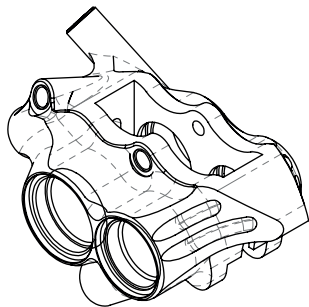
Small Piston Seal x2  
HBSP125

Small Piston x2  
HBSP135

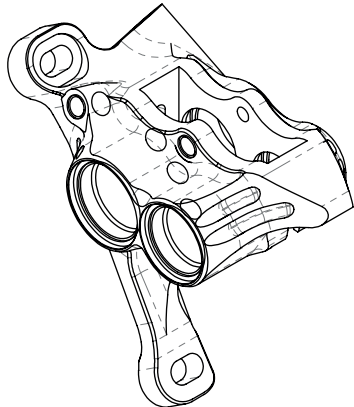
Small Bore Cap O'Ring  
HBSP138



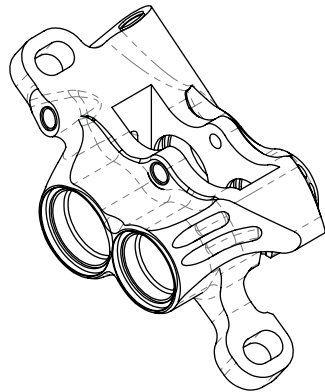
CALIPER BODY VARIATIONS



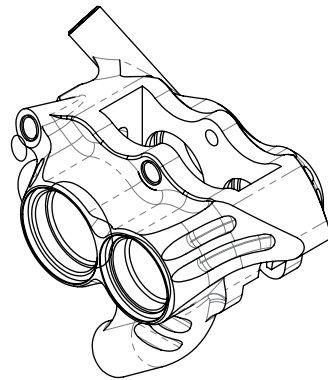
RX4+ Flat Mount  
HBSP414



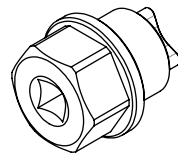
RX4+ Flat Mount Front +20  
HBSP415



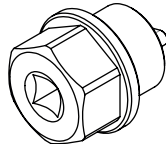
RX4+ Post Front  
HBSP416



RX4+ Flat Mount +20  
HBSP417



Large Bore Cap Tool  
HTTC-TC  
NOT TO SCALE



Small Bore Cap Tool  
HTTC-TB  
NOT TO SCALE



ONLY USE DOT4 OR  
5.1 BRAKE FLUID  
WITH THIS CALIPER.



RX4+ MINERAL OPTION  
CALIPER ASSEMBLY

M5 Bleed Nipple  
HBSP339

3  
Num

Large Piston x2  
HBSP136

Large Piston Seal x2  
HBSP365  
RED SEAL

Pad Pin  
HBSP204

4  
Num

Large Bore Cap O'Ring  
OR 13x1.5 HNBR  
RED MARK ON O'RING

Large Bore Cap  
HBSP369

Small Bore Cap  
HBSP368

10  
Num

Pad Spring  
HBSP142

Brake Pad [pair]  
HBSP323

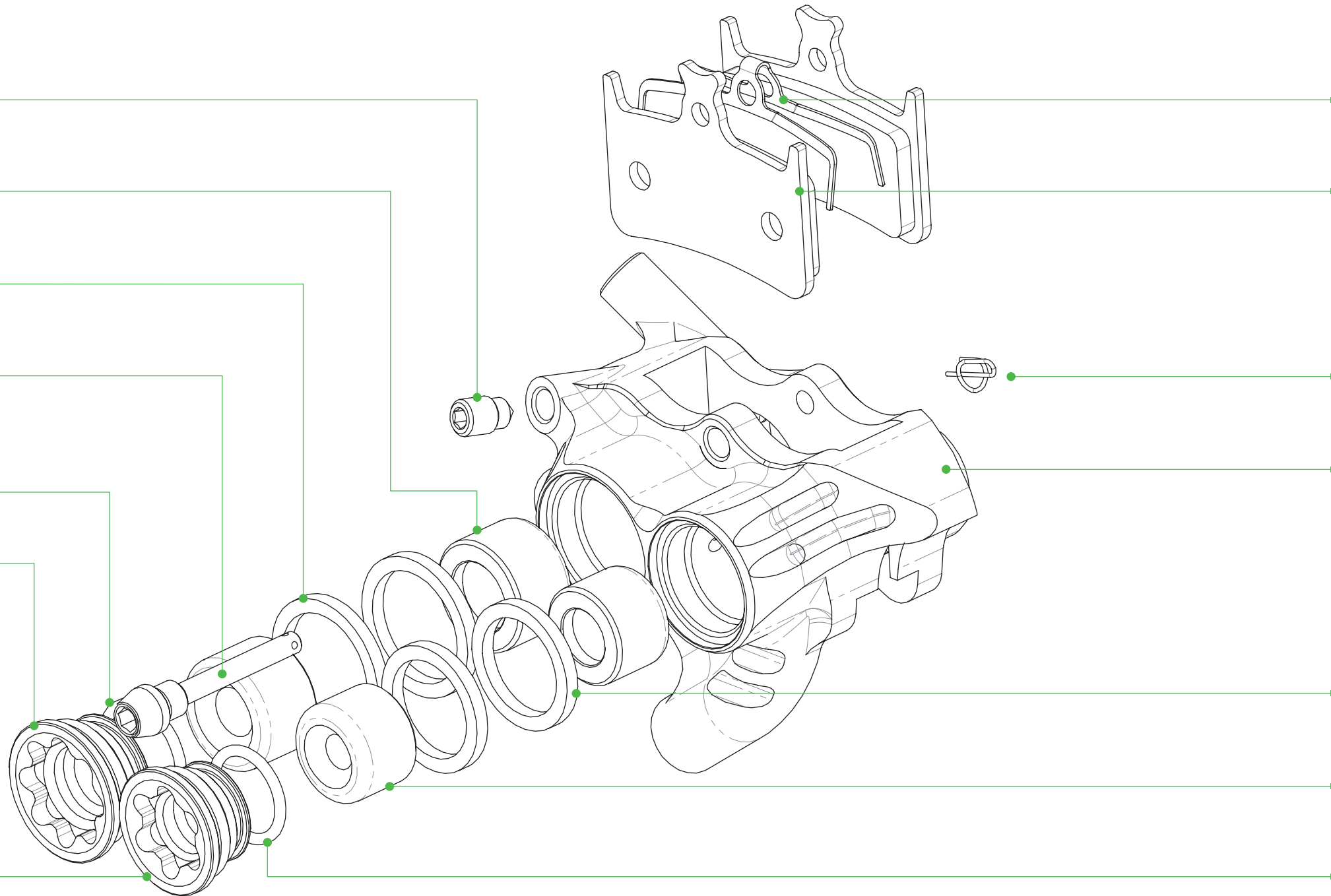
Pad Pin R Clip  
HBSP171

RX4+ Caliper Body  
FM+20  
HBSP417

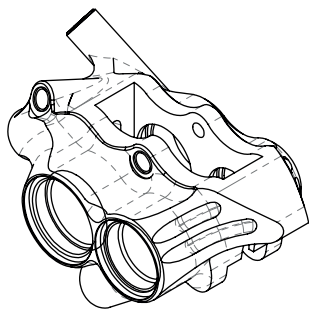
Small Piston Seal x2  
HBSP364  
RED SEAL

Small Piston x2  
HBSP135

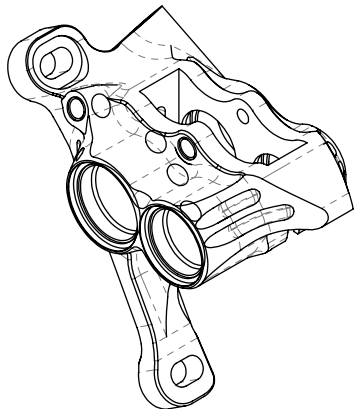
Small Bore Cap O'Ring  
OR 11x1.5 HNBR  
RED MARK ON O'RING



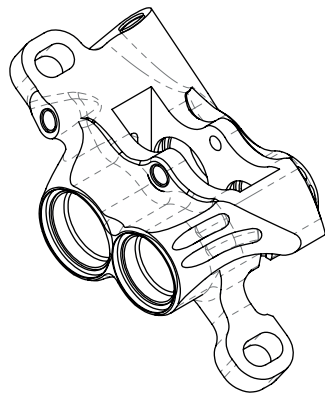
CALIPER BODY VARIATIONS



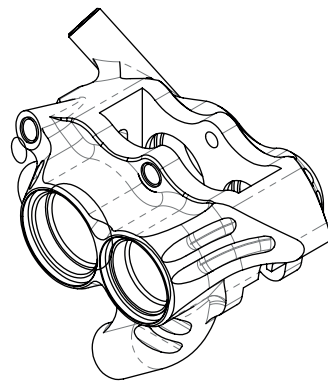
RX4+ Flat Mount  
HBSP414



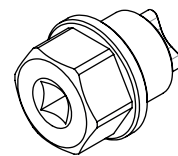
RX4+ Flat Mount Front +20  
HBSP415



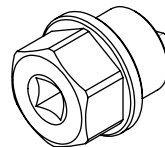
RX4+ Post Front  
HBSP416



RX4+ Flat Mount +20  
HBSP417



Large Bore Cap Tool  
HTTC-TC  
NOT TO SCALE



Small Bore Cap Tool  
HTTC-TB  
NOT TO SCALE



ONLY USE MINERAL OIL  
WITH THIS CALIPER

- » Compatible supplied piston seals must be RED.
- » Compatible supplied bore cap O'Ring must have a RED distinctive mark on them.



# TRIAL ZONE DISC BRAKE CALIPER ASSEMBLY

Connector Bolt  
HBSP047



Bleed Nipple  
HBSP238

Bleed Nipple O'Ring  
HBSP239



Rubber Cap  
HBSP240

Pad Pin  
HBSP204



Bore Cap O'Ring  
HBSP251

Bore Cap  
HBSP250



LH Drive

M6 Sealing Washer x2  
HBSP26

90° Connector  
HBSP162

Pad Pin R Clip  
HBSP171

9:74 Post Mount  
Caliper Body  
HBSP360

Brake Pad  
HBSP170

Piston x2  
HBSP166

Piston Seal x2  
HBSP207

Bore Cap Tool  
HTTC-TD  
NOT TO SCALE



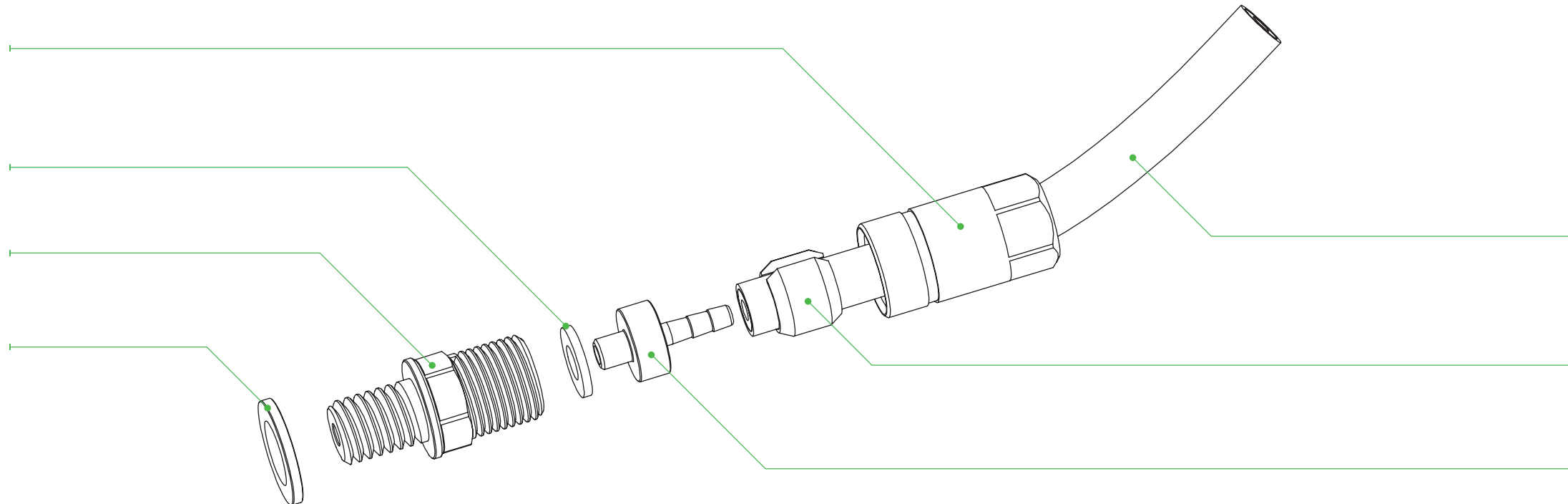
Ø5mm Hose (1 line)  
HBSP158  
Ø6mm Braided Hose  
Shroud (2 lines)  
HBSP158S  
Copper Washer  
HBSP161



Straight Connector  
HBSP163



M6 Sealing Washer  
HBSP26



Standard Black  
Hose Ø5mm  
HBSP172  
Braided Hose Ø5mm  
HBSP157

Olive  
HBSP159

Hose Insert  
HBSP160

Ø5mm Hose (1 line)  
HBSP158  
Ø6mm Braided Hose  
Shroud (2 lines)  
HBSP158S

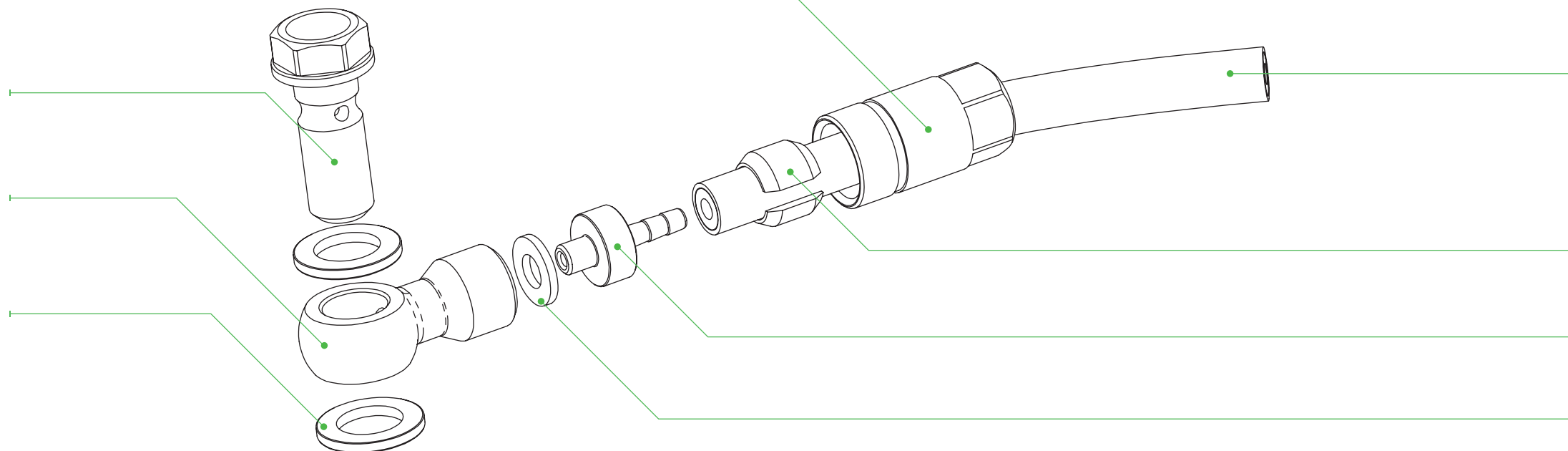


90° Connector Bolt  
HBSP47



90° Connector  
HBSP162

M6 Sealing Washer x2  
HBSP26



Standard Black  
Hose Ø5mm  
HBSP172  
Braided Hose Ø5mm  
HBSP157

Olive  
HBSP159

Hose Insert  
HBSP160

Copper Washer  
HBSP161



## NOTE:

Shroud with two lines is compatible with Ø6mm braided hose only, hose supplied before 10/2017. If you are in doubt, check hose diameter.



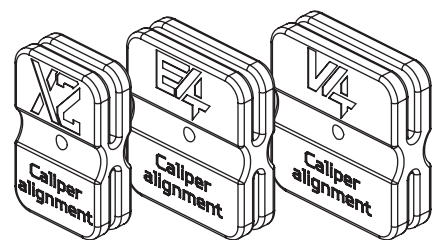
DIRECT SHIFTER MOUNT  
SELECTION CHART

		<div>SRAM Shifters</div> <div>All removable Clamp types</div> <div></div>	<div>SRAM Shifters</div> <div>AXS POD types</div> <div></div>	<div>Shimano Shifters</div> <div>I-Spec A &amp; I-Spec B</div> <div><div></div><div>I_Spec A with hook</div><div></div><div>I_Spec B without hook</div></div>	<div>Shimano Shifters and Dropper Lever</div> <div>I-Spec II &amp; I-Spec EV</div> <div><div></div><div></div><div>SL-MT800</div></div> <div><div>I-Spec II: XTR SL-M9000 and XT SL-M8000 ONLY</div><div>I-Spec EV: XTR SL-M9000-I, SL-M9100-I,</div><div>XT SL-M8000-I, SL-M8100-I,</div><div>SLX SL-M7100-I</div><div>DEORE SL-M6100-I, SL-M5100-I</div></div>
<div>TECH FOUR</div>	<div></div> <div>Part Number: HBSPC81</div>	<div></div> <div>Part Number: HBSP 426 - RH/LH</div>	<div></div> <div>Part Number: HBSP 441 - RH/LH</div>	<div>No Shifter Mount available</div>	<div></div> <div>Part Number: HBSP 431 - RH/LH</div>
<div>XCR</div>	<div></div> <div>Part Number: HBSP400</div>	<div></div> <div>Part Number: HBSP 325 - RH/LH</div>	<div></div> <div>Part Number: HBSP 442 - RH/LH</div>	<div>No Shifter Mount required!</div> <div>The Shimano shifter will mount <b>directly</b> on to Tech 3 and XCR Master Cylinder.</div> <div><div></div><div></div></div> <div>NOTE: For Tech 3 Master Cylinder produced <b>BEFORE MARCH 2019</b>, use M5 x 16 cap screw and HBSP 322 square nut.</div>	<div></div> <div>Part Number: HBSP 385 - RH/LH</div>

### 3D PRINTABLE TOOLS

Many people are beginning to have access to simple 3D printing allowing consumers to produce their own simple tools and fixtures.

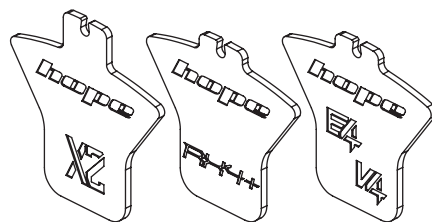
In the factory we've produced a few of these for our own staff and mechanics so we thought we'd open them up for everyone to use.



#### CALIPER ALIGNMENT TOOL

Positions the caliper square and central to the disc. Essential for good brake performance.

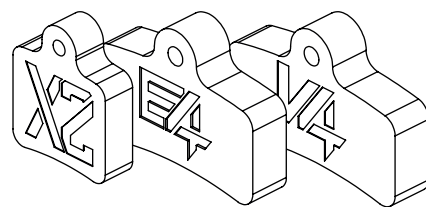
>> X2 | E4/RX4+ | V4



#### PAD SPACERS

Install when the wheel is removed to prevent the pads moving if the lever is accidentally pulled.

>> X2 | E4/RX4+ | V4



#### BLEED BLOCK

Install when bleeding the brake to stop your pads getting contaminated. A set of old pads can also be used.

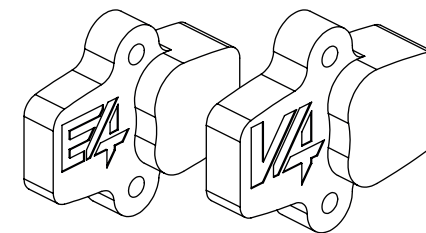
>> X2 | E4/RX4+ | V4



#### V4 CALIPER TUNING TOOL

Allows a slightly larger fluid volume in the brake when running with thinner rotors and will help to maintain consistent performance during hard use.

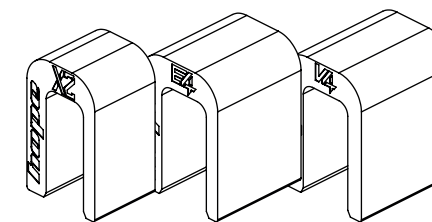
>> V4



#### PISTON SERVICE TOOL

On 4 piston calipers; allows a single piston to come out at a time to facilitate cleaning and lubrication.

>> E4/RX4+ | V4



#### PISTON SEAL SERVICE TOOL

When changing caliper seals this tool holds the outer pistons in the caliper, allowing the inner pistons to move out and make them easy to remove.

>> X2 | E4/RX4+ | V4

### BLEED KIT

Although not essential to bleed your brake system the Easy Bleed kit will greatly help the process.

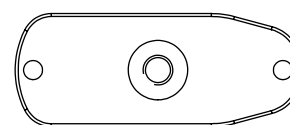
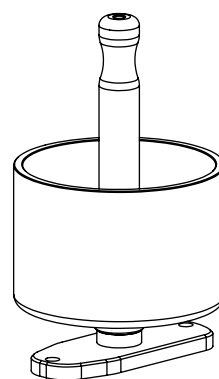
>> Tech 4: HTTEBK4  
>> XCR and Tech 3: HTTEBK1

Bleed kit master cylinder lids

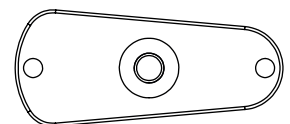
are also available separately.

>> HTT0019 Tech 4  
>> HTT0011 XCR/Tech 3

For professional use only, and positive pressure bleeding for any brake use the workshop bleed kit reference HTTBLWK.



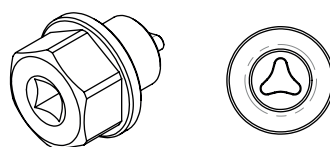
Tech 4



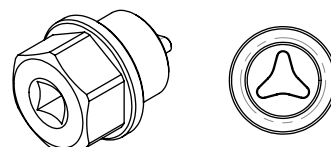
Tech 3

### BORE CAP TOOLS

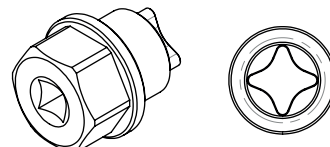
A caliper bore cap tool will be required if you wish to replace caliper piston seals. The correct tool reference is found on each caliper exploded view.



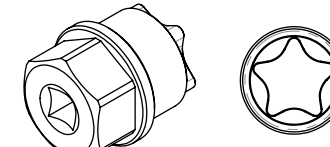
A Type - HTTC-TA



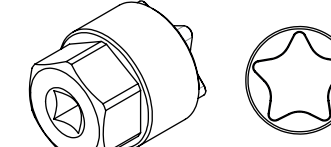
B Type - HTTC-TB



C Type - HTTC-TC



D Type - HTTC-TD



E Type - HTTC-TE



**BLEED BLOCK NOTE:** This block is narrower than the pad slot to allow the pistons to be moved during bleeding and ensure no air gets trapped in the caliper. **Do not** use third party bleed blocks that fill the pad slot in the caliper and keep the pistons pushed back in the caliper housing.



DESIGNED, TESTED AND  
MANUFACTURED IN  
BARNOLDSWICK, UK.