

## Vision Racing Products (VRP) Product List & Descriptions

### 1. 8th 'XV4' 15.85mm Pistons

The pistons come with the Transition Valves (not installed). The Rebound booster hole has been precision drilled to the exact size our testing found to be the best 'all around' setting. This yields excellent results that are proven on a variety of track surfaces. From rough, blown out tracks, to smooth, indoor clay, the VRP Piston makes a positive difference and gives you a Big Advantage over the competition!

Simple to understand! The Pistons are designed to increase the Rebound only. They do not change the compression from what you would have running stock 8 hole 1.2 pistons. No crazy set up changes. No scratching your head if they work or even made a difference. Anyone who has run them will tell you it was better from the moment they squeezed the trigger! No questions!

You will feel a difference in the piston because it is designed for the oil to flow through the holes instead of around the perimeter. We suggest starting with the normal oil you would use. Remember, the compression stroke stays the same, only the rebound is quicker.

\*Important: The VRP 'XV4' Pistons are designed to have a washer under and over them. It is important to run washers and that they are correctly installed. Each set of pistons is supplied with a Washer Hardware Pack to make sure you have what you need to install them.

Each set of pistons comes with 4 different upper washers that are color coded. The washers are made to more or less cover the rubber valves to give different rebound rates. The Black washer gives the most rebound, Red is a little less rebound, Gold is slightly less rebound than the Red washer, and the Blue washer is the least rebound. For tracks that are loose and low grip, or very blown out with large ruts, more rebound is better. On smooth or tracks that have very high grip, less rebound is better. We suggest starting with the Black Washer in the rear pistons, and the Red Washer in the front pistons.

### 2. 8th 'XV4' 15.80mm (HBB)

Same functionality as 8th 'XV4' 15.85mm Pistons but these are considered HIGH BLOW BY (HBB). This is a pair of (2) Patented VRP 'XV4' HBB Pistons. They are smaller than our normal piston to allow more oil flow around the piston diameter, which will increase the bump absorption.

### 3. 8th 'XV4' VRP Tuner Pistons

This is a pair of (2) Patented VRP XV4 'Tuner' Pistons with Valves and Hardware. We have developed the VRP 'Tuner' Piston to be the ultimate 'tunable' piston for RC Racers. Each piston has 20 individual dimples for the normal holes. Below is a chart where the holes are numbered like a clock, so they can be used as a way of drilling the piston with holes from 4 to 10 holes. These are just a suggestion. There are many possible combinations. 3 Hole, 7 Hole, 12 Hole, etc. Use a high quality drill bit set like the VRP Piston Drill Sets. And finish the job with the VRP Piston Chamfer Tool. The Return holes are 1.2mm, and with the 4 different upper washes allows for a good range of adjustment. The 'Tuner' Pistons use the same rubber valves and washers as the VRP 'XV4', so everything is interchangeable. And we have listed the pistons by themselves so racers can easily have undrilled sets ready for tuning at the next race. Just swap the hardware over!

Tips:

1. Over-all flow – The total number of holes X the sum of the hole diameters determines Over-all Flow. The actual calculated number compared to calculated numbers from other drill patterns help build a range and determine any given pistons flow. This number is not exact, (we're looking for easy) but it will greatly help differentiate one piston from another.
2. Hole Sizes – The hole size greatly influences pack and the timing of when it kicks in. A smaller hole will pack much sooner than a larger hole. And it usually takes more smaller holes to get over-all flow. And the opposite is true for larger holes. They pack later, and usually need less holes to get over-all flow. Pistons with different sized holes will pack smoother than a piston with all the same holes. This is because each hole packs at a different time, and that spreads the pack out.

3. Hole Thickness- Most Pistons are right around 2.55mm thick. So the holes going thru the piston are also about 2.55mm long. This length of the hole affects pack. The longer the hole, or thicker the piston, the more time it takes the oil to flow thru the hole in an organized way, and thus produces what we feel as pack. Some pistons are 2mm thick. These are usually called 'Thin' pistons. They take pack out. And conversely, a 3.0mm thick piston produces more pack. You can reduce the hole length by using the VRP Chamfer Tool and beveling the holes. This in effect reduces the hole length and reduces pack.

4. Return Valve Holes – The VRP Piston valving is patented because it is by far the most efficient way to do the return. In full scale motorsports, all chassis have compression and rebound control. And the VRP Piston gives you this. The original research showed that the average return rate for most full scale motorsports (and SX especially) was right around 7% faster return than compression. And that's what the Xv4 Pistons are valved too (red upper washers). This is a great all around rate. But some conditions, like super rutted, would benefit by more return, or if the track is very high grip and smooth, less rebound is needed. So I suggest starting with 1.1mm to 1.2mm return holes.

The VRP Team will use 1.0mm and 1.1mm additional holes in the 10th and 8th pistons to soften the low speed dampening, while not affecting the high speed pack. The very small holes only flow at low speed. They essentially 'lock up' under high speed dampening. This gives the buggy more grip because the suspension will absorb small imperfections in the surface.

One idea that helps racers a lot is this: Your running the front suspension 'into' bumps and ruts, ....and your 'dragging' the rear suspension over bumps and ruts. So there is a big difference. Mainly, the front takes more pack, and the rear takes less. So keep that in mind.

For the best holes – Lay Piston flat on table, use hand drill. Drill a 1mm pilot hole, and then the final hole size. Use the VRP Chamfer tool by finger to finish holes. If using a dremel, be careful. Use low speed.

\*Important: The VRP 'XV3' Pistons are designed to have a washer under and over them. It is important to run washers and that they are correctly installed. Each set of pistons is supplied with a Washer Hardware Pack to make sure you have what you need to install them.

Comes in a HIGH BLOW BY VERSION too.

#### **4. 8th 'XV3' – ST VRP Pistons**

This piston design features a slightly slower rebound stroke matched with an improved 'connected' compression stroke, resulting in better handling on smooth surfaces. Just like our XV3 and XV3-HT, this is another option for you to fine tune your suspension from track to track. The 'ST' piston was designed specifically for tracks that don't break up and remain smooth, and range from low to high grip. Featuring our Patented Design, the new 'ST' piston is simple and easy to use. It is "plug and play", simply install and go! The VRP XV3-ST line of pistons are available for all the popular 1/8th vehicles in 5, 6, and 8 holes.

#### **5. 8<sup>th</sup> Scale 6 or 8 Hole Gamechangers**

\* Check Tuning Guide Below \*

HP – High Pack

MP – Medium Pack

LP – Low Pack

The Pistons come complete with Rubber Rebound Valves, Carbon Fiber Compression Valves, Mounting Hardware, and Instructions. Patent Pending Design.

Rebound System:

First we started with our XV2 Piston and the Quick Rebound System it has. It was important to keep the exact function of that system because its proven track performance and obvious ease of understanding. The Rebound Valve has been re-designed and updated to be smaller and use less of the inner thickness of the piston to improve durability. This minimization was also needed to fit another 'system' into a small part like a piston.

## Compression System:

This System was designed through hours of research on oil flow and pressures built at the face of the piston from surface tension. I made 100's of iterations refining the technology, which meant hours and hours of programming and machining, countless shock rebuilds, test drops, test jumps, slow motion videos, and ultimately track testing. Over the last 8 months, I have refined the invention into a smooth working model that fits what we do in racing. The System is 'Smart'. It senses shaft speed and reacts as needed. The Patent Pending CFV (Compression Flex Valve) allows the Piston to have Slow Shaft Speed and High Shaft Speed Compression.

**Slow Shaft Speed Compression:** At neutral, it is as soft as any shock with a normal set of comparable pistons. On the bench, you will find the suspension is subtle. Its important that this stays in the range of what we run now, it is what makes the suspension soak up bumps and give forward grip as well as a responsive feel at the wheel. So I made the 'Low Shaft Speed' Compression very similar to what you know.

**High Shaft Speed Compression:** At High Shaft Speeds like landing a large jump, the CFV will flex and partially cover some of the flow holes and provide additional damping to keep the chassis off the ground. It flexes different amounts depending on the impact and the 'shaft speed', so it will respond accordingly. If for example you were to land a smaller jump, the CFV will flex less and provide the correct amount of damping at the time needed. Once the shaft slows down, the valve immediately returns to Slow Shaft Speed Compression, and the damping becomes softer.

**Carbon Fiber Compression Flex Valve:** Engineered with 20 years of composite experience, the actual Carbon Fiber is made in house at the VRP facility in Houston. It is unique. From the Carbon itself to the Resin its made with, the properties are designed and tailored for the purpose. They are similar to a reed valve for a musical instrument and care should be taken when handling them. Treated properly, they should last the lifetime of the vehicle.

**New Era of Performance:** You will never have a buggy land, respond, settle, and be ready for throttle quicker than the Gamechanger Piston. Many jumps and landings become a fluid motion with no chassis scrub or momentum loss. The pistons also make the car more true off the face of every jump because it does not dig in. You will find it easier to manage jumps both taking off and landing like never before. This makes your consistency increase and ultimately your racing success. Where the chassis dug in before and you needed turn marshaled, it won't and you will continue on.....

## 6. 8th 'XV4' 22Hole Pistons

The new VRP 22 hole XV4 piston builds on the VRP 20h technology. It is designed to be a compliment to the 20h and give the racer a different 'high flow' piston option for tracks that are rough and bumpy. The new 22h piston will be able to absorb ruts and bumps better yet still land great and settle super-fast like the 20h.

The 22h piston design comes from months of studying and testing how holes interact with other holes, the fluid dynamics between them, the spacing, and flow patterns. The initial pack has been moved a small amount deeper in the stroke over the 20h, as well as given the piston the ability to 'blow by' under extreme impacts like edged ruts.

It is unique. There are 3 sets of holes that work together to produce the outcome. In a way like lines of code for an app, that put together makes the app look and function.

The 22h gives strong grip on loose surfaces, increasing the control and ease of driving. In grippy conditions, the 22h allows the buggy to roll into the suspension more, reducing edginess and making it easier to drive, which results in higher corner speeds.

Oil range for the 22h is 500 to 800, depending on grip and track temps. At a larger track which is higher speed, bigger jumps, medium bumpy/rough, testing oils were 700 front and 650 rear +/--. At a smaller, looser, very bumpy track, the testing oils were 600 front and 550 rear +/--. These were at around 85 degrees. An easy routine way to adjust oils is to drop test the buggy and adjust so it doesn't bottom. For larger, higher grip tracks, higher speeds, medium bumpy/rough drop from 12 to 14". For smaller, tighter, loose, slower speeds, extreme rough, drop test from 8 to 10". This will account for the differences in each buggies geometry as well as track temps. In the video, the oils are 600 front, 550 rear at 75 degrees.

