



[WWW.BLACKMAGICCLUTCHES.COM](http://WWW.BLACKMAGICCLUTCHES.COM)

## DEFIANT X

10.00" 3 LEVER INSTRUCTION AND PRESSURE SHEETS



## BLACK MAGIC CLUTCHES

15084 LIV 240 CHILLICOTHE, MO 64601

[CALE@BLACKMAGICCLUTCHES.COM](mailto:CALE@BLACKMAGICCLUTCHES.COM)

816-390-0852

\*\*\* When disassembling the Defiant X Clutch Assembly for installation, make sure not lose the small washer/shims from between the cover and flywheel. In addition to the large spacers there are additional shims at each bolt/stud. These should be kept in place as the cover assembly has had the ring height already set when purchasing a new compete unit or after coming back from servicing.

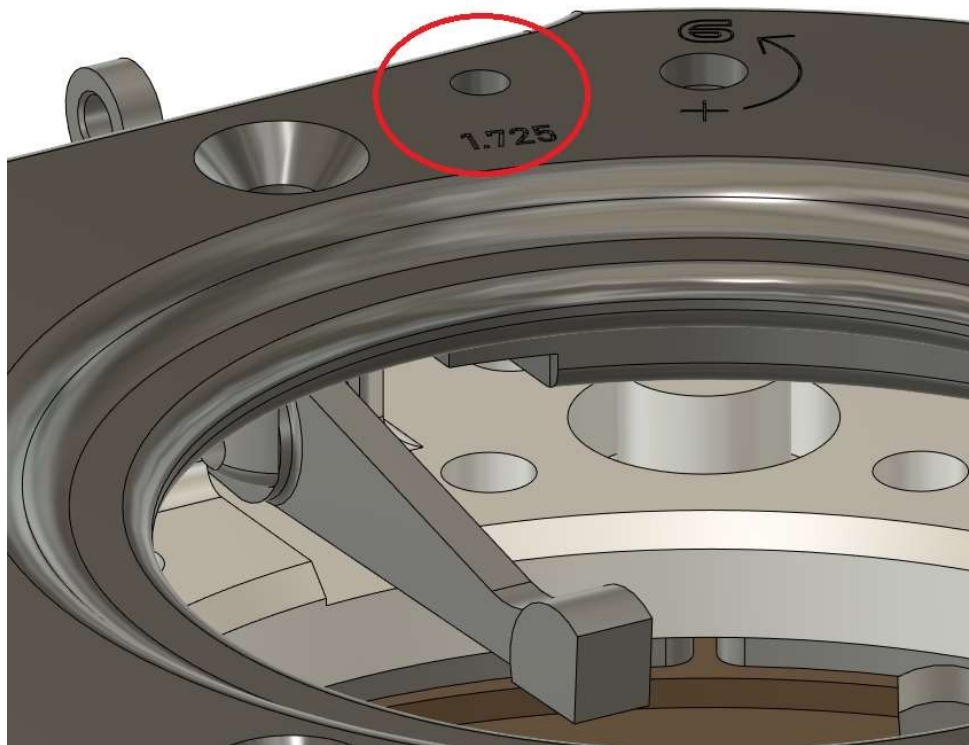
## Ring Height

- Base/Standard ring height should be 1.725" (Pictured)

This is measured by using the tip of a set of dial calipers to measure through the hole in the cover from the face of the cover down to the pressure plate.

- Ring Height can be adjusted by shimming between the cover and flywheel.

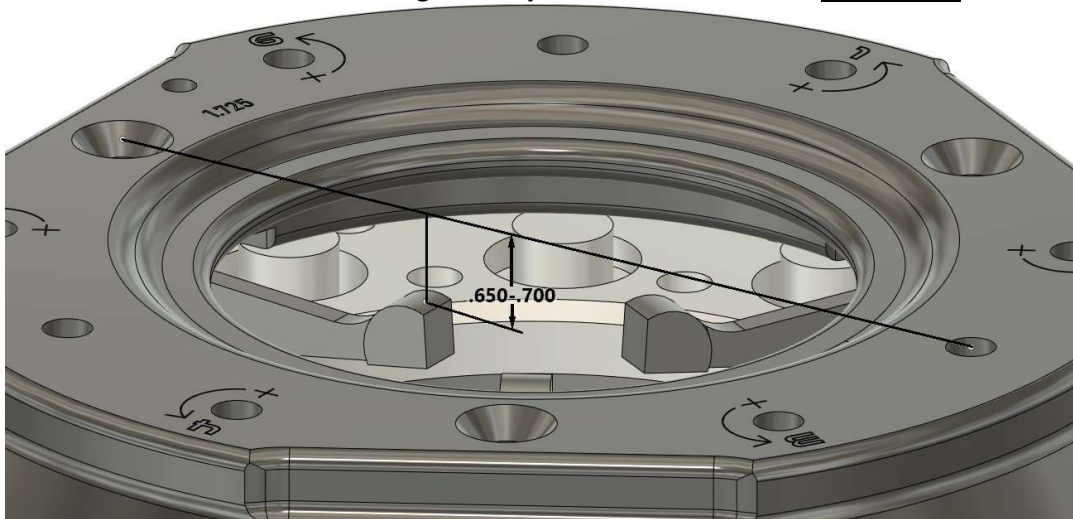
- This will change as the disc wears. We don't recommend re-shimming to reset lever height until at least a .030" change (.030" wear off the disc). The levers will move upward towards the bearing as the ring height changes. You will lose approximately 12 lbs of base pressure with every .010" of disc wear/ring height change.



## Lever Height

- Standard Lever Height is set and measure two ways. Either from the tip of the lever to a straight edge, or by measuring the gap between top of lever and the bottom edge of the cover. (Both Pictured Below) There should never be more than a .007" variance in all three levers so that the throwout bearing makes even contact and will ensure the same air gap at all three lever lug locations around the full diameter of the clutch surface.

**When Measuring to the lever tip with a straight edge,  
place straight edge flat across the cover surface.  
When Measuring this way levers can be set from .650 - .700"**



**When Measuring to the gap between lever and cover  
When Measuring this way levers can be set from .280" - .330"**

## Adjusting Lever Height

- The Defiant utilizes precision machined yokes, that have minimal variance in overall height. As it is rarely needed to adjust lever height except after a rebuild/servicing we have returned to the shim style method of adjusting to give the cover a flat profile across the top. By using flat shim stock we can adjust the lever height up or down. The shims are placed between the yoke and bottom of the cover at each lever location. The Defiant X features Dyno tested and designed levers that allow the use of conventional counter weight with specific applied pressure information (provided below), with the added feature of "In-Board" counter weight holes located inside the cover closer to the throwout bearing. In addition to lever height controlling the applied pressure rate of the levers, we can control this much more effectively by utilizing in-board counter weight. We work directly with customer's choosing to use this feature. Most commonly used in lower hp/weight combinations with higher rpm.

## Disc Options

- New units will feature either a .330" or .380" thick disc. This is selected at the time of order to work with clearance options and overall use of the clutch.
- Most standard built units will come with a standard 5135 type compound.
- We work with customers on their specific combination on each clutch and in some cases suggest a different disc material to lessen friction coefficient and allow for the use of more applied pressure through base and counter weight offering a larger tuning window.

## Common Disc Materials

**5135 – Most Aggressive Compound**

**5050 – Medium (We rarely use this in drag racing)**

**5191 – Least Aggressive**

## Additional Black Magic Compound Options

**BMC-850** - Approximately 15% Less Friction Coefficient as 5191,  
Better Door Car Compound on Lower HP

**BMC-PS1** – Approximately 7% less friction coefficient than standard 5191

**Sintered Bronze** – Approximately in the middle of 5135 and 5191, however will increase friction coefficient as it sees an increase in temperature.

**The disc should always be placed with the raised part of the hub towards the transmission and away from the flywheel s seen below.**



## Specifications and Design Information

### Spring Information / Base Pressure

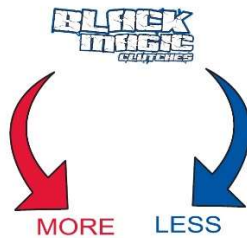
- Free Length: 2.08"
- Rate of Pressure: 208 lbs per Inch or 52 lbs per 1/4 Inch
  - Base Sheet Provided at 1/4 turn increments
  - Maximum Turns: 7 Turns
- 360 lbs Total Pressure at Zero Turns (Standard 1.725" Ring Height)
- Cover to Flywheel Bolt/Stud Torque should be "snug" or approximately 30 ft/lbs

\*\*\* We don't recommend more than 6.5 turns. If the adjuster backs completely out of the aluminum adjusters the unit must be taken apart and the adjusters must be rethreaded into the cups. Running the clutch with them fully backed out of the cups, it will damage them.

Clockwise Removes Base / Counter Clockwise Adds Base.

To start turn all the way clockwise until fully loose.

Turn Counter Clockwise until you start to feel slight resistance. Start counting from there.



### Counter Weight

- 1/4 Inch holes are located to the outside of the clutch unit to add counter weight.
  - There are also "in-board" counter weight holes on the inside of the lever (towards the hub)
    - These holes can be used to slow the rate of applied pressure, but we recommend consulting with Cale Aronson for exact tuning information.
  - Attached is an Applied Pressure Sheet showing the applied pressure in Lbs, over every 100 rpm.
- \*\* Loctite should never be used on counter weight!!

### Installation Notes:

**When you receive a Defiant Assembly new or rebuilt from Black Magic Clutches, your ring height and lever height will already be set. Simply remove the cover from the flywheel, install the flywheel onto your crankshaft. Be careful to keep all shims located on the studs/bolts in place as this is what is used to set your "Ring Height". After installing your flywheel, reinstall your disc and cover assembly. Using an alignment tool center the disc on the flywheel/pressure plate surface and install the nuts on the studs/bolts. Evenly draw the cover down and if torquing apply approximately 30 ft/lbs on cover nuts.**

**Upon receiving your clutch, get in touch with us for a starting point and any general procedure questions!**

**\*\* It's easier to install with no turns of base as it will have the least pressure. Add base pressure after installation.**

**Throwout Bearing:** You should run a wide, flat faced bearing that covers the lever tips completely. If needed, contact us for bearing options.

**Free Travel:** This is the distance between the throwout bearing and levers when clutch pedal is in the up/non-engaged position. There should be .200" - .250" free travel between you throwout bearing and levers. We recommend a stiff return spring to keep bearing way from levers. Bearing to lever contact can reduce applied pressure and cause damage to the levers as well as premature wear and excessive slippage.

**Air Gap:** This is the amount of clearance between the disc and either heat shield when the clutch is depressed. Generally measured with a feeler gauge. We recommend between .045" minimum and .075" maximum. You should have an adjustable positive/solid clutch pedal stop to set this properly. This should be checked regularly as wear of the disc will effect it. Heat also will cause a variance as the materials expand.

**Two Step:** Your two step/launch rev limiter should be set to turn on/off at the point the bearing comes in contact with the levers and should stay on throughout the travel of the clutch cycle. Do not tie this function to your line-lock.

**Defiant X 10.00" 3 Lever Applied Counter Weight Pressure**

<b>GRAMS</b>	<b>lb per gram</b>	<b>15</b>	<b>18</b>	<b>21</b>	<b>24</b>	<b>27</b>	<b>30</b>	<b>33</b>	<b>36</b>
3500	8.1	121.7	146.0	170.3	194.6	219.0	243.3	267.6	292.0
3600	9.1	135.9	163.1	190.3	217.4	244.6	271.8	299.0	326.2
3700	10.0	150.2	180.2	210.2	240.2	270.3	300.3	330.3	360.4
3800	11.0	164.4	197.3	230.2	263.0	295.9	328.8	361.7	394.6
3900	11.9	178.4	214.0	249.7	285.4	321.0	356.7	392.4	428.0
4000	12.8	192.2	230.6	269.0	307.4	345.9	384.3	422.7	461.2
4100	13.7	205.8	247.0	288.1	329.3	370.4	411.6	452.8	493.9
4200	14.6	219.2	263.0	306.8	350.6	394.5	438.3	482.1	526.0
4300	15.4	230.9	277.0	323.2	369.4	415.5	461.7	507.9	554.0
4400	16.3	243.9	292.7	341.5	390.2	439.0	487.8	536.6	585.4
4500	17.1	256.5	307.8	359.1	410.4	461.7	513.0	564.3	615.6
4600	18.2	272.7	327.2	381.8	436.3	490.9	545.4	599.9	654.5
4700	18.9	283.2	339.8	396.5	453.1	509.8	566.4	623.0	679.7
4800	19.8	296.7	356.0	415.4	474.7	534.1	593.4	652.7	712.1
4900	20.9	313.2	375.8	438.5	501.1	563.8	626.4	689.0	751.7
5000	21.5	322.7	387.2	451.7	516.2	580.8	645.3	709.8	774.4
5100	22.5	336.8	404.1	471.5	538.8	606.2	673.5	740.9	808.2
5200	23.4	351.5	421.7	492.0	562.3	632.6	702.9	773.2	843.5
5300	24.5	366.9	440.3	513.7	587.0	660.4	733.8	807.2	880.6
5400	25.4	380.3	456.3	532.4	608.4	684.5	760.5	836.6	912.6
5500	26.3	394.8	473.8	552.7	631.7	710.6	789.6	868.6	947.5
5600	27.1	407.1	488.5	569.9	651.4	732.8	814.2	895.6	977.0
5700	28.2	422.9	507.4	592.0	676.6	761.1	845.7	930.3	1014.8
5800	29.1	436.7	524.0	611.3	698.6	786.0	873.3	960.6	1048.0
5900	30.3	455.0	545.9	636.9	727.9	818.9	909.9	1000.9	1091.9
6000	31.1	466.4	559.6	652.9	746.2	839.4	932.7	1026.0	1119.2
6100	32.1	480.9	577.1	673.3	769.4	865.6	961.8	1058.0	1154.2
6200	33.4	500.4	600.5	700.6	800.6	900.7	1000.8	1100.9	1201.0
6300	35.0	525.6	630.7	735.8	841.0	946.1	1051.2	1156.3	1261.4
6400	36.0	540.2	648.2	756.2	864.2	972.3	1080.3	1188.3	1296.4
6500	37.5	562.1	674.5	786.9	899.3	1011.7	1124.1	1236.5	1348.9
6600	39.2	587.3	704.7	822.2	939.6	1057.1	1174.5	1292.0	1409.4
6700	40.2	602.7	723.2	843.8	964.3	1084.9	1205.4	1325.9	1446.5
6800	41.3	619.7	743.6	867.5	991.4	1115.4	1239.3	1363.2	1487.2
6900	43.1	646.1	775.3	904.5	1033.7	1162.9	1292.1	1421.3	1550.5
7000	44.8	672.3	806.8	941.2	1075.7	1210.1	1344.6	1479.1	1613.5
7100	46.5	697.1	836.5	975.9	1115.3	1254.7	1394.1	1533.5	1672.9
7200	48.4	726.0	871.2	1016.4	1161.6	1306.8	1452.0	1597.2	1742.4
7300	50.1	751.4	901.6	1051.9	1202.2	1352.4	1502.7	1653.0	1803.2
7400	52.0	779.7	935.6	1091.6	1247.5	1403.5	1559.4	1715.3	1871.3
7500	53.8	806.6	967.9	1129.2	1290.5	1451.8	1613.1	1774.4	1935.7
7600	55.6	833.7	1000.4	1167.2	1333.9	1500.7	1667.4	1834.1	2000.9
7700	57.3	858.9	1030.7	1202.5	1374.2	1546.0	1717.8	1889.6	2061.4
7800	59.1	886.7	1064.0	1241.3	1418.6	1596.0	1773.3	1950.6	2128.0
7900	60.8	911.9	1094.2	1276.6	1459.0	1641.3	1823.7	2006.1	2188.4
8000	62.7	940.1	1128.1	1316.1	1504.1	1692.1	1880.1	2068.1	2256.1

**Applied Base Pressure (Per 1/4 Turn)**

**360 Lbs at Zero Turns**

Turns	Pressure		Turns	Pressure
0.25	368.5		3.75	627.5
0.5	387		4	646
0.75	405.5		4.25	664.5
1	424		4.5	683
1.25	442.5		4.75	701.5
1.5	461		5	720
1.75	479.5		5.25	738.5
2	498		5.5	757
2.25	516.5		5.75	775.5
2.5	535		6	794
2.75	553.5		6.25	812.5
3	572		6.5	831
3.25	590.5		6.75	849.5
3.5	609		7	868



Black Magic Clutches / Aronson Motorsports

[www.blackmagicclutches.com](http://www.blackmagicclutches.com)

[Cale@BlackMagicClutches.com](mailto:Cale@BlackMagicClutches.com)

816-390-0852