



MULTI-GEARED PRECISION TUNING

# Product Guide



IMPORTANT

## PRODUCT REGISTRATION

Register for your Graph Tech "Love it or Return it" Guarantee!

And... for a limited time, qualify for a **FREE** set of Invisomatch Premium Mounting Plates available in Chrome, Gold, Nickel or Black.

Find out all the details by registering at **[my.graphtech.com/warranty](http://my.graphtech.com/warranty)**

*Invisomatch Premium mounting plates are also available for purchase at music stores or online at [www.graphtech.com](http://www.graphtech.com)*



Chrome



Gold



Black



Nickel









## Why Upgrade to Ratio Multi-Geared Machine Heads?

> Each string has its own optimized gear ratio, so every strings reacts the same to any tuning adjustment.

Tuning, re-tuning, and open tunings are faster, more accurate and predictable.

> Hardened steel, double envelope gears on the high ratio gears, for enhanced durability and an ultra-smooth response.

> Triple plated Chrome, Gold, Nickel or Black finishes

String	E	A	D	G	B	E
						
Gear Ratio	39:1	24:1	20:1 - Acoustic 35:1 - Electric	35:1	20:1	12:1



### Standard









### Locking



### Open-Back



Guitar Type	Head Stock Type	Button Options	Installation Options	Finish Option
Electric	3 + 3 or 6-in-line	 Classic	 One screw or Two pin or (Standard Plates Included)	Chrome Nickel Gold Black
		 Contemporary		
		 Contemporary mini		
		 Vintage		
Acoustic	3 + 3	 Contemporary		

US Patent: 8,859,868 | International Patents Pending

## INSTALLATION: InvisoMatch Mounting Plates *(the easy way!)*

### REQUIRED TOOLS:

**STEP 1** Remove your old machine heads, any screws, and bushings

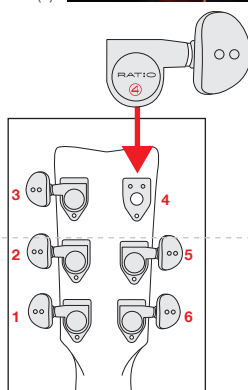
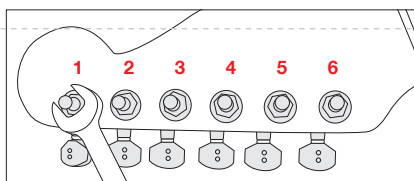
**STEP 2** Find the InvisoMatch plate matching your old machine heads *(if none match, proceed to Standard Method)*

**STEP 3** Screw down matching Invisomatch plates using pre-existing screw hole(s)



### IMPORTANT

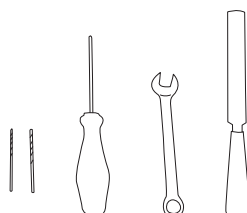
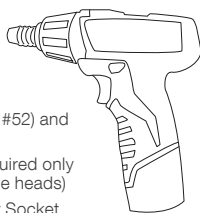
- Install all machine heads into the proper mounting hole by matching the number on the gear cover plate to the number over the headstock hole.
- Tighten all nuts using 10mm (7/16") wrench.



## INSTALLATION: Standard Method

### REQUIRED TOOLS:

- ① Drill
- ② Drill bits: 1/16" (1.6mm / #52) and 7/64" (2.5mm / #40)
- ③ Phillips Screwdriver (required only for screw mount machine heads)
- ④ 10mm (7/16") Wrench or Socket Wrench
- ⑤ Straight edge



①

②

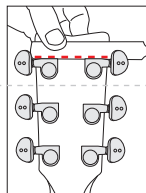
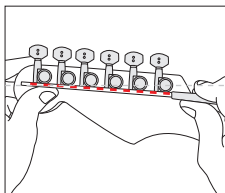
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⑤

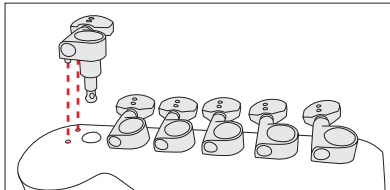
### STEP 1 Align Machine Heads

- Place your Ratio machine heads into the headstock mounting holes. [Machine head hole diameter is 7/16" (10mm)]
- Align the machine heads using a straight edge, while gently finger tightening the mounting nuts.



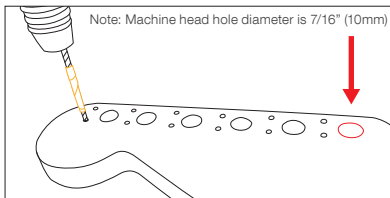
### STEP 2 Mark Alignment Holes

- Once aligned, finger tighten the mounting nuts and firmly press the machine heads against the back of the headstock. The mounting pins will leave indentations in the headstock to mark the required hole locations.



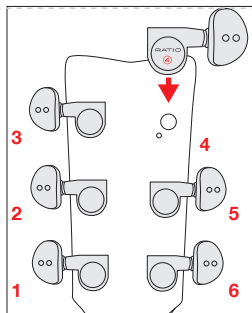
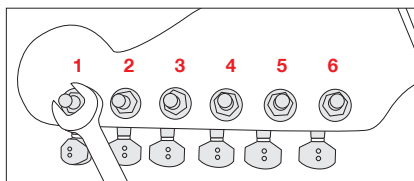
### STEP 3 Drill Alignment Holes

- Using a 1/16" (1.6mm / #52) drill bit, drill pilot holes to a depth of 1/8" (3mm). Use masking tape to mark drill bit for your drilling depth
- Using a 7/64" (2.5mm / #40) drill bit, drill alignment holes to same depth.
- Test machine head to ensure fit.
- Repeat for all machine heads.



### STEP 4 Install Machine Heads

- Install Ratio machine heads in the correct order (refer to red numbers in images) using the supplied washer and bushing.
- Tighten all nuts using 10mm (7/16") wrench.



Okay, now its time to play! You'll realize in time, Ratio is a lot different than any other machine head you have ever used. You don't have to sneak up on the plain G string (most electric guitar string sets) or the low E string, which require finer tuning. You also don't have to crank away on the high E or D string, as these strings are geared to a lower ratio. As a matter of fact, every string now feels the same to tune. Try doing one full rotation of any tuning key; the pitch of that string will change one tone (give or take). So, if you do any open tunings, or dropped D tunings, with a bit of practice you are going to the exact pitch a whole lot quicker than you ever did before. Welcome to the world of Graph Tech!

I'd love to hear about your Ratio experience. You can email me directly at [dave@graphtech.com](mailto:dave@graphtech.com)

- Dave Dunwoodie, Head Honcho