CYCLING FUSION™

For the love of the ride inside and out

DEMYSTIFYING POWER TRAINING FOR INDOOR CYCLING

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YOU'RE NOT ALONE

- You're not alone, but you are ahead
- How many ride outside, and train with a Power Meter?
- How many of you know someone who uses a Power Meter?
- How many of you teach at a club with Power Bikes?
- Do you think this is a fad or a trend that will fade away?

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WHAT IS POWER?

- The product of strength and speed of movement
- The energy produced for work done in a given time frame.
- A measure of intensity normally expressed as a watt.
- For the rider, Power = Cadence or pedal speed x gear or resistance (RPM x resistance)
- There is no power when there is no force on the pedals even if you are pedaling.

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POWER METER BASICS

- A training tool that measures the amount of work done during a given period of time.
- Displays live data during a ride for biofeedback displayed in average, relative (%) or absolute (whole number) watts.
  Example: 55% of Power Threshold or 175 watts
- Growing popularity for indoor and outdoor cycling.
- A power meter is only a tool, it is **not a training system**

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POWER METER EQUIPMENT

SRM

PowerTap

Quarq CinQo

Measuring Power from the Crank or Hub

iBike

Calculating Power from the Wind & other factors

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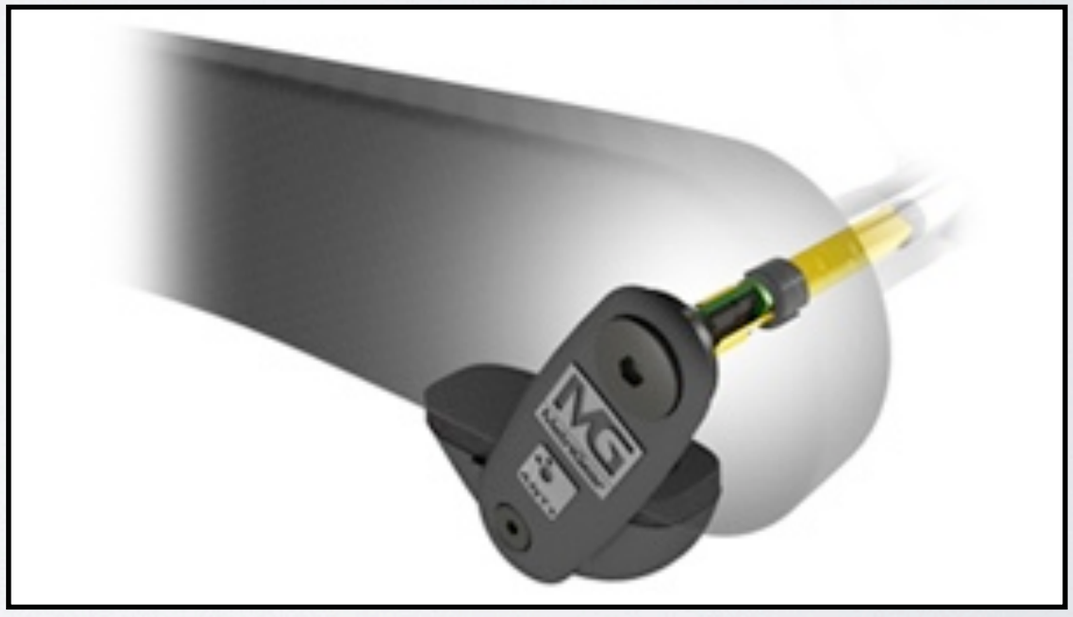
POWER METER EQUIPMENT

Measuring Power from the Pedal

iBike with iPhone

Power Pedal - Look & Polar



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CALCULATED NOT MEASURED

- Outside of CycleOps, all other indoor stationary bikes have calculated not measured power
- Measured power is much like your electric meter at home, measuring actual usage
- Calculated power uses the combination of your RPM and the "gear" you are on and looks up the Watts from an internal table in the bike console's computer
- Accuracy is less for calculated power, but that does not diminish the value of training, or the principles to apply

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I DON'T RIDE OUTSIDE

WHY SHOULD I CARE ABOUT POWER?

- Power Training will increase muscular strength.
- Power Training will improve the toning of your leg muscles
- Power Training will improve your cardiovascular fitness as a natural by-product of focused training at higher intensities
- Power Training will help prevent "plateaus" in fitness development or weight loss
- Power Training will add variety and motivation to your existing workout routine

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I RIDE OUTSIDE

WHAT'S THE BIG DEAL ABOUT POWER?

- Power Training will improve climbing, possibly more than any other method for improving this critical aspect of cycling
- Power Training will help you target very specific types of riding; climbing, sprinting, time trialing, etc.
- Power Training will allow you to make comparisons between your own workouts, and between different riders
- Power Training allows you to evaluate your relative strength within a given area of cycling
- Power Training will add a lot of variety to your workouts

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KEY FACTS ABOUT POWER TRAINING IN GENERAL

- Power is the best predictor of performance
- Power is not a better method of training than heart rate, it is simply different
- Watts represent a mechanical feedback, compared to heart rate which represents metabolic feedback
- The main goal in Power Training is to increase one's Watts per pound in each Power Zone

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WATTS PER POUND

- Watts per pound reflects your "power to weight ratio"
- Watts per pound is calculated by dividing power output by body weight. *Example: if you average 150 watts and your weight is 150 pounds = 150/150 = 1 watt per pound*
- Watts per pound is easier for Americans to understand than Watts per kilograms
- Watts per pound can be used by coaches and cycling instructors to keep the entire class at the same effort level regardless of the rider's size or weight.

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WATTS PER POUND

- Climbing ability is very dependent on the power to weight ratio of the rider (plus bike & whatever is being carried)
- The great equalizer - Watts / Kg or Lb
- Why not KG? In class Watts/Lb can be done in your head
- Watts per pound is an equalizer which allows riders an accurate comparison of their power
- There is little difference between women and men in power generation except at the elite level

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ONE WATT PER POUND

The Gateway To Outdoor Riding

- Below 5 mph, it is extremely difficult to keep a bike on line, rolling straight, safe and steady.
- Below 5% grade it's not much of a hill.
- Road construction guidelines range from 5% to 12%
- **Make it a goal to sustain it**

Grade	5%	6%	7%	8%	9%	10%
MPH						
5.0	0.5	0.7	0.8	0.9	1.0	1.1
6.0	0.7	0.8	0.9	1.0		
7.0	0.8	0.9	1.1			
8.0	0.9	1.0				
9.0	1.0					

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CADENCE CONSIDERATIONS

- Don't pedal below 60 RPM (50 RPM if you have strong knees and experience)
- Don't pedal above 110 RPM (120 RPM if you can do so with ZERO bouncing)
- The higher the cadence, the higher the power.
- Research has shown that cadences of 70 to 90 seem to offer the greatest efficiency and least fatigue.
- Do Sweet Spot drills: Maximum power, in the most comfortable cadence

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INTRODUCING POWER IN THE CLASSROOM

- Use previous sections to feed a few points per class about why all riders - indoors and out - benefit from Power Training
- Use Games as a way of de-mystifying and un-intimidating Power Training
- Learn RELATIVE CUEING

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RELATIVE NOT ABSOLUTE

- The #1 rule for teaching with power, is to always give **RELATIVE** cues, not absolute ones.
- The principle is the same for Heart Rate training. Just as you would never direct your class to go to a specific BPM, you should never direct them to a specific gear or Wattage number.
- Relative Cue Examples:
  - Add 1 gear from wherever you are (rather than "go to gear 15")
  - Add 10% of your body weight in watts (rather than "add 10 watts")

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"THE BASEMENT"

- Everyone enters the cycling room with a different power generation ability
- Getting everyone on the "same page" will be easier during the warmup - should be less variation on what that feels like
- Do a progressive warm up where they turn up their resistance 1 or 2 times only, but would still consider the effort "warm up" level
- After 4 to 6 minutes, have them look at what gear or power number they are at, and "declare" that to be their basement

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USING THE BASEMENT

- Using our #1 rule, we can now use the Basement as our point of RELATIVE reference
- Our increases in power can now be made relative to this warmup level. Some examples:
  - "Let's go to 3 gears above our basement"
  - "Add 20% of your body weight in watts to your basement watts, and that's the watts you should generate on the next song" Notice the cue is given in advance of the song - so they can exercise their brain (no extra charge for the brain workout) to do the calculations.
  - "We are going to recover to just 1 gear above your basement"

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POWER GAMES

- **X Songs to X Gears** - Works well for Keiser M3, possibly others (I often use 10 X 10 for the M3)
  - Do some experimenting on your own first - how wide is your own range?
  - Assume your average student has a smaller range, but some may have a much bigger range.
  - Set up your playlist such that you progressively use more power by at least 1 gear per song, but possibly as many as 3 per song depending on how your specific bike works

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POWER GAMES

- **10% per Minute -** Increase Watts by by 10% of rider's body weight
  - This is useful for long climbs of increasing effort. It's a way of having each student add the "same" level of resistance.
  - This provides a way to cue everyone the same instead of just "turn it up"

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POWER GAMES

- **Where's My Sweetspot** - What cadence/gear ratio provides the highest power rating at a target heart rate
  - This game works best in a class that has a good handle on their Heart Zones
  - Pick a Target Zone and have the students continue to increase their gear or resistance until they go past that target
  - They can also try to increase cadence unless their Heart Rate goes outside the target. This should be repeated with different cadences and gear combinations to find where they are the most efficient

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KNOW YOUR STUDENTS

- **The #2 rule** for teaching with power is: **USE RANGES** when using Watts/Lb.
- The range of power generation ability in any one class can be enormous. Try to get a handle on how wide this range is for your students (especially if you have a group of regulars)
- Here is how you can get a handle on this
  - You should announce what you are doing, and get permission from the class to do this, because knowing what their range of Watts/Lb are, requires that you know what they weigh - and many will not want to give that information up.

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ESTABLISHING THE CLASS RANGE OF WATTS/LB

- Get your class well warmed up (20 min at least), then have them ride at least 5 minutes in high Zone 4 - 5 beats below threshold, or use RPE to get them close.

- Walk around the room and record their Watts and weight - you could even do this anonymously (no names written)

- This then requires some homework after class to see where everyone falls - and thus you have your range of Watts/Lb

- Even though you will get new people from time to time, this will give you a good sense of the ranges to use

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POWER CHARTS HELP

Power Zones For Indoor Cycling

Power Zones		Watts/Lb	POWER IN WATTS														
Rider's Weight →			100	120	130	140	150	160	170	180	190	200	210	220	230	240	250
Explosive Power Zone (1 - 2 min Power)		**1.5**	**150**	**180**	**195**	**210**	**225**	**240**	**255**	**270**	**285**	**300**	**315**	**330**	**345**	**360**	**375**
Bring It On!	16% - 4 mph	1.45	145	174	189	203	218	232	247	261	276	290	305	319	334	348	363
Some Steeps	10% - 6.5 mph	1.4	140	168	182	196	210	224	238	252	266	280	294	308	322	336	350
More Speed	4% - 15.5 mph	1.35	135	162	176	189	203	216	230	243	257	270	284	297	311	324	338
Med Grades	8% - 7.5 mph	1.3	130	156	169	182	195	208	221	234	247	260	273	286	299	312	325
Rollers	7% - 8 mph	1.25	125	150	163	175	188	200	213	225	238	250	263	275	288	300	313
Fast Flats	3% - 18.5 mph	1.2	120	144	156	168	180	192	204	216	228	240	252	264	276	288	300
Climbing Power Zone (3 - 6 min Power)		**1.15**	**115**	**138**	**150**	**161**	**173**	**184**	**196**	**207**	**219**	**230**	**242**	**253**	**265**	**276**	**288**
Confidence	12% - 4 mph	1.1	110	132	143	154	165	176	187	198	209	220	231	242	253	264	275
Climb Steady	7% - 7 mph	1.05	105	126	137	147	158	168	179	189	200	210	221	231	242	252	263
I Can Climb	6% - 8 mph	1	100	120	130	140	150	160	170	180	190	200	210	220	230	240	250
Stronger	5% - 9 mph	0.95	95	114	124	133	143	152	162	171	181	190	200	209	219	228	238
Road Riding	4% - 10.5 mph	0.9	90	108	117	126	135	144	153	162	171	180	189	198	207	216	225
More Speed	3% - 13 mph	0.85	85	102	111	119	128	136	145	153	162	170	179	187	196	204	213
Sustainable Power Zone (7 - 20 min Power)		**0.8**	**80**	**96**	**104**	**112**	**120**	**128**	**136**	**144**	**152**	**160**	**168**	**176**	**184**	**192**	**200**
Low Grades	6% - 5.5 mph	0.75	75	90	98	105	113	120	128	135	143	150	158	165	173	180	188
Cruisin'	5% - 6.5 mph	0.7	70	84	91	98	105	112	119	126	133	140	147	154	161	168	175
Flat Roads	4% - 7.5 mph	0.65	65	78	85	91	98	104	111	117	124	130	137	143	150	156	163
Rail Trail	3% - 9 mph	0.6	60	72	78	84	90	96	102	108	114	120	126	132	138	144	150
Recovery	4% - 6 mph	0.55	55	66	72	77	83	88	94	99	105	110	116	121	127	132	138
WarmUp	3% - 7.5 mph	0.5	50	60	65	70	75	80	85	90	95	100	105	110	115	120	125

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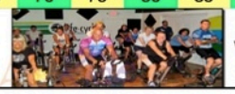

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.5 to 1.5 Watts/Lb

1.0 to 3.0 Watts/Lb

Power Zones For Outdoor Cycling

Power Zones		Watts/Lb	POWER IN WATTS														
Rider's Weight →			100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250
Explosive Power Zone (1 minute Power)		**3.0**	**300**	**330**	**360**	**390**	**420**	**450**	**480**	**510**	**540**	**570**	**600**	**630**	**660**	**690**	**720**	**750**
At The Line	40+ MPH	2.9	290	319	348	377	406	435	464	493	522	551	580	609	638	667	696	725
Final Attack	6% - 18.5 mph	2.8	280	308	336	364	392	420	448	476	504	532	560	588	616	644	672	700
Sprint Finish	3% - 40+ mph	2.7	270	297	324	351	378	405	432	459	486	513	540	567	594	621	648	675
Pulling Uphill	5% - 26 mph	2.6	260	286	312	338	364	390	416	442	468	494	520	546	572	598	624	650
Sprint Lead Out	3% - 37 mph	2.5	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625
Cover The Move	4% - 28 mph	2.4	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600
Climbing Power Zone (3 minute Power)		**2.3**	**230**	**253**	**276**	**299**	**322**	**345**	**368**	**391**	**414**	**437**	**460**	**483**	**506**	**529**	**552**	**575**
The Wall	17% - 6 mph	2.2	220	242	264	286	308	330	352	374	396	418	440	462	484	506	528	550
Bridge The Gap	4% - 24 mph	2.1	210	231	252	273	294	315	336	357	378	399	420	441	462	483	504	525
Lead The Break	3% - 30.5 mph	2	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500
5 minute Climbing Power			5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min	5 Min
Stand & Deliver	13% - 6.5 mph	1.9	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456	475
Feel The Burn	12% - 7 mph	1.8	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	450
Break Away	7% - 11 mph	1.7	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	425
Sustainable Power Zone (20 minute Power)		**1.6**	**160**	**176**	**192**	**208**	**224**	**240**	**256**	**272**	**288**	**304**	**320**	**336**	**352**	**368**	**384**	**400**
Steep Climb	10% - 7.7 mph	1.5	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375
Hard Climb	9% - 8 mph	1.4	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	350
Climbing Legs	8% - 8.5 mph	1.3	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325
Median Grade	7% - 9 mph	1.2	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	300
Hill Yes	6% - 10 mph	1.1	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264	275
Steady Grade	5% - 11 mph	1	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250

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POWER GAMES

- **X Watts/lb per Song** - How high can we go, and for how long?
  - This is similar to the 10% per minute, only rather than looking at it for just 1 song, we are doing this for the entire ride.
  - Depending on where the student starts from (.5 Watts/Lb or 1.0 Watts/Lb are very different starting points) the increase per song could feel very different.
  - If you use Cycling Fusion Power Zone charts, they are done on .1/Watt or .2/Watt increases, and may be an easy reference

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POWER GAMES

- **5 X 5 Watts and/or BPM** - increase Watts or BPM 5 separate times in alternating increments of 5
  - This is one way to use power for Interval or Climbing classes.
  - While the other Power games employ the effort progressively (always a solid training concept), this game provides the framework for intense efforts right after the warmup
  - Make a point to describe the intervals or hills you are riding as they relate to the Watts/Lb you are calling out
  - Because of the differences in ability, use ranges of Watts/Lb

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POWER GAMES

- **Tour de Power** - after 2 or 3 power classes (there is a CD included with your material showing one way to do this)
- This pre-supposes that you are implementing the Cycling Fusion method of power training, or that you have some way to challenge both ends of your class
- Provides a way to teach the nature of power and how to use it:
  - You can generate greater power if the time interval is shorter
  - When you climb outside, you need to draw on multiple different ranges of power, so each must be developed

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BRINGING INDOOR AND OUTDOOR CYCLING TOGETHER

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