CycleOps Joule™ 2.0

User Guide

CycleOps
POWER

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Chapter 1: Starting Out

Thank you for purchasing CycleOps Joule 2.0, the first cycling computer designed for cyclists who train with power.

This user guide is just one of the resources to help you understand all the features Joule 2.0 has to offer.

Please visit www.cycleops.com to:

- Learn more about Joule 2.0 and the CycleOps system of products including stationary trainers, indoor cycles, software and power meters
- Register all CycleOps products and activate warranty
- View instructional videos
- Sign up for the CycleOps Power newsletter- your source for the latest news and technical updates from CycleOps Power

WARNING: Always consult a physician before beginning or modifying any exercise program.

Unpacking Joule 2.0

Remove all parts from the box to ensure the following contents are included:
PACKAGE CONTENTS:

Item	Part Description	Qty
•	Joule 2.0 computer	1
•	Heart rate strap	1
•	Standard mount	1
•	Indoor cycle mount	1
•	Mount bolts	2
•	Mount knobs	2
•	Training with Power DVD	1
•	USB cable	1

Please contact your local dealer or Saris Cycling Group with any questions at 1-800-783-7257.

Compatibility

Joule 2.0 is compatible with any ANT+ compatible power meter, speed sensor, cadence sensor or heart rate strap. For more information on ANT+ compatible devices, please visit www.thisisant.com. Note: Joule 2.0 is not compatible with wired version of PowerTap and non-ANT+ PowerTap models such as the SL 2.4.

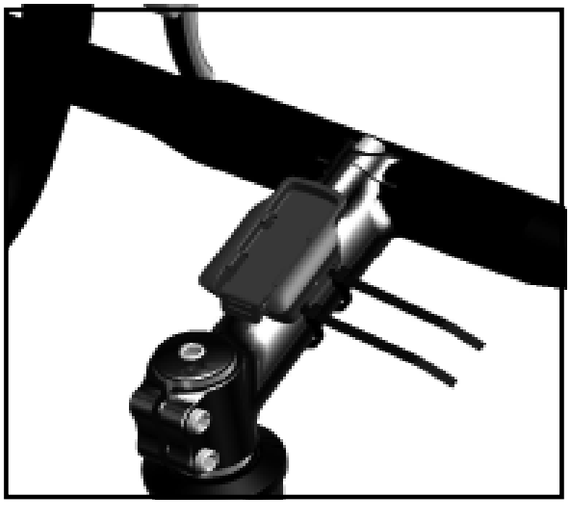
In addition, Joule 2.0 is compatible with the following CycleOps products:

1. PowerTap G3C, G3C Power Meter
2. PowerTap Pro Power Meter (2011+)
3. PowerTap 2.4+ Power Meter
4. PowerTap Elite+ Power Meter
5. PowerTap Pro+ Power Meter
6. PowerTap SL+ Power Meter
7. PowerTap SLC+ Power Meter
8. PowerBeam Pro Trainer*
9. 200 Pro Indoor Cycle
10. 300 Pro Indoor Cycle
11. 400 Pro Indoor Cycle*
12. CycleOps PowerAgent Software

*Important: Unit must be plugged in to work with Joule.

Installing CycleOps Joule™ 2.0 Using Standard Mount

The standard mount can be installed in either stem or handlebar orientations for use on any handlebar or stem. The mount is preassembled for the stem orientation.



1. For stem orientation insert two zip ties through bottom of mount and attach sticky pad. Secure to stem.

2. Position Joule 2.0 slightly behind mount.

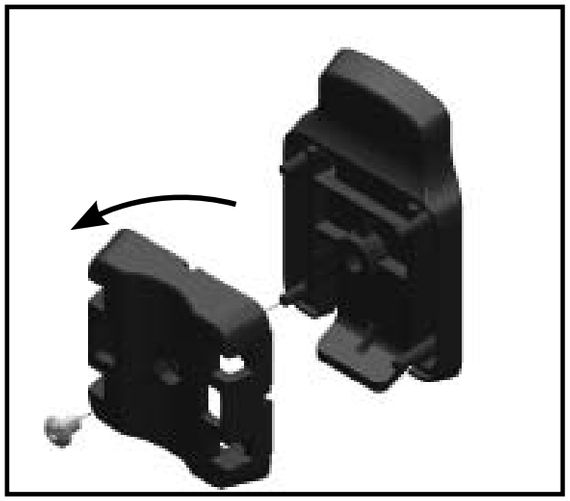
3. Slide Joule 2.0 forward into mount until it snaps into place.

4. Be sure to check Joule 2.0 is secure in mount before riding.

5. To remove Joule 2.0 , press down on the release lever and slide Joule 2.0 back. Note: additional sticky pads may be used if release lever is not accessible due to stem length or angle.

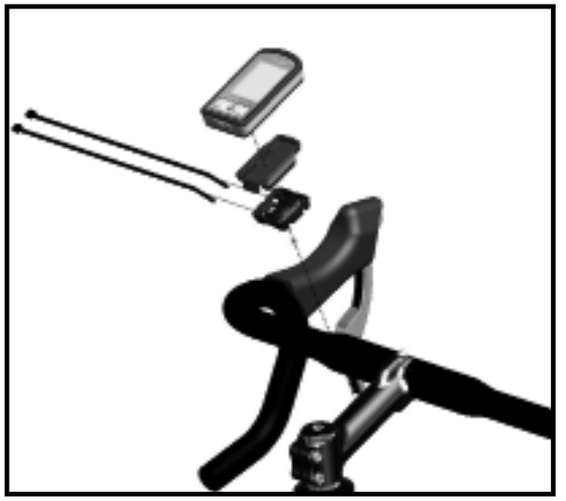
Installing CycleOps Joule™ 2.0 Using Standard Mount

For handlebar orientation, change the standard mount from the preassembled stem orientation.



1. Remove screw that holds bottom of mount and rotate 90 degrees.

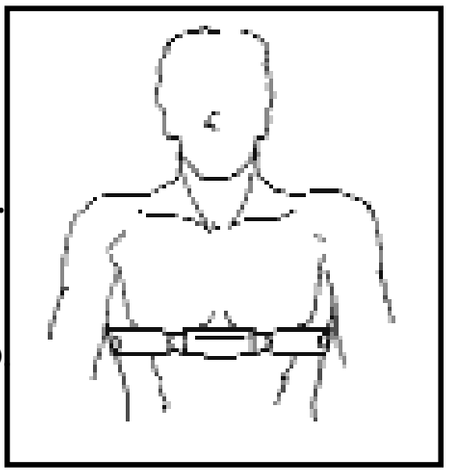
2. Insert screw threw bottom of mount.



3. Insert two zip ties through bottom of mount. Apply sticky pad and tighten zip ties to secure mount.

4. Handlebar orientation. Be sure to check Joule 2.0 is secure in mount before riding.

CycleOps (ANT+) Heart Rate Strap

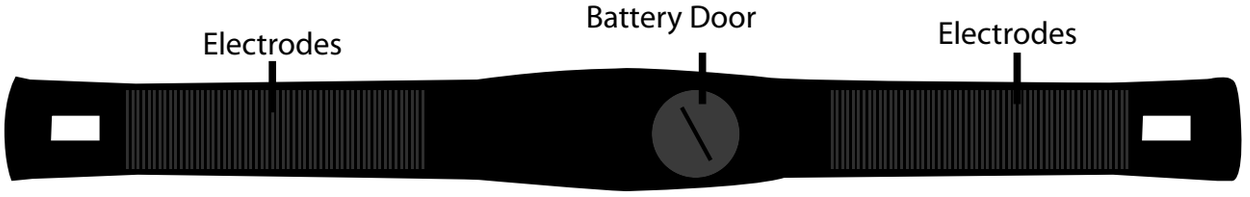


Wearing the heart rate strap, position it above torso as pictured. The strap should rest just beneath the pectoralis muscles of the chest. For best results slightly moisten the electrodes where contact is made with skin. The heart rate strap must be worn to enable the heart rate function. It should be snug enough to stay in place during the ride.

NOTE: Joule 2.0 is compatible with any ANT+ compatible heart rate strap. The CycleOps heart rate strap contains a user replaceable CR2032 battery; with an expected life of three years, assuming one hour of use per day. After replacing sensor battery, Joule must be re-paired to heart rate sensor. See Sensor section on page 39.

Band

Front of Heart Rate Strap



Back of Heart Rate Strap

Charging Battery

The Joule 2.0 is powered by a user replaceable lithium-ion battery that can be recharged using the included USB cable and a computer. A 5VDC 400mA charger can also be used (not included). A fully charged battery can run for approximately 20 hours before it must be recharged. Recharging completely, via USB cable or AC adapter will take approximately six hours. The battery level is indicated in the title bar. The Joule 2.0 is fully charged at the factory, but shipping and handling may inadvertently consume charge. For more information see Important Precautions section on page 38.

Front of Joule

Back of Joule

Battery cover

Mini-USB port

1. Press in release [MODE] button or [INTERVAL] button to turn on Joule 2.0. Note: Pressing [JOYSTICK] will not turn Joule 2.0 on.

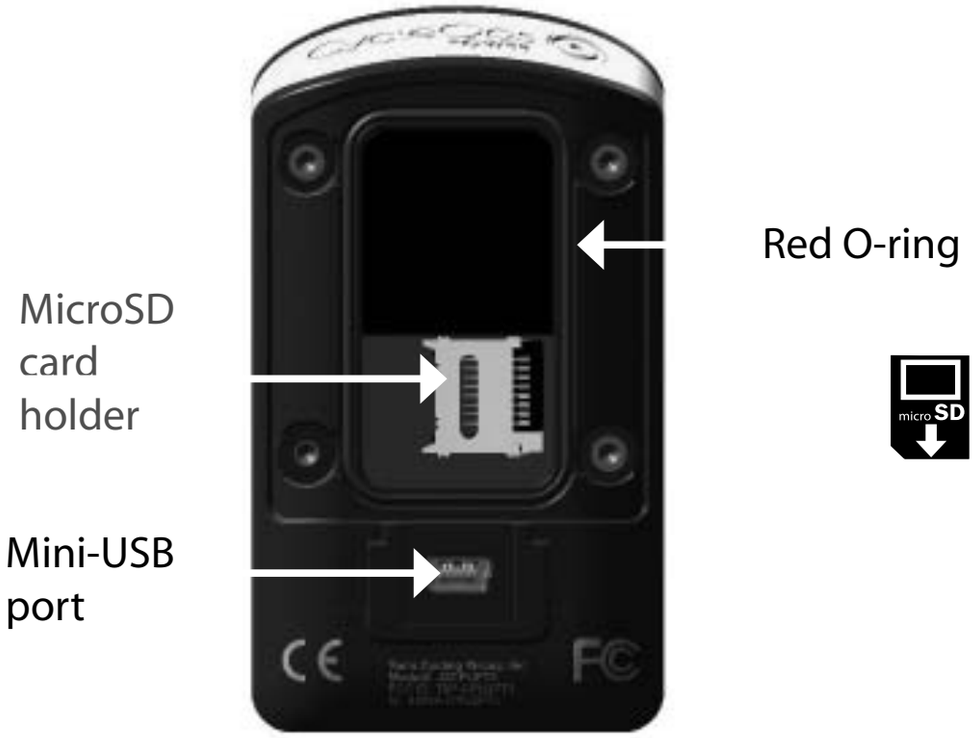
2. Plug the mini-USB cable into the mini-USB port on the back of Joule 2.0 and plug the other end into an available USB port on a computer.

3. A standard AC adapter to wall outlet is available separately.

4. Once connected to a computer or AC adapter, Joule 2.0 displays the connection and charge screen (charging or charge complete). No data will be displayed.

Installing MicroSD Card

Joule 2.0 provides 4 MB of onboard memory for storing activities, history and workouts. Activity file size increases with ride time but a one hour ride is approximately 150 KB, history files are always 1 KB (1,000 history files = 1 MB) and workout files also increase with workout size but a workout containing 500 segments will be approximately 50 KB. A microSD card slot is available under the battery for additional memory. Once a microSD card is installed, all files are stored on the card. For more information see Data Management section on page 16.



1. Remove the four screws attaching battery cover to Joule 2.0.

2. Remove battery cover. Remove battery. Note: disconnecting the battery is not necessary. Be careful not to damage the o-ring

3. Slide microSD card into microSD card holder, behind battery.

4. Attach battery cover and four bolts, using screwdriver. Make sure red O-ring is clean and in place before attaching battery cover. O-rings should be inspected and replaced if necessary whenever the battery cover is removed. Use a light coating of grease when re-installing the battery cover on the O-rings.

Navigation Overview CycleOps Joule™ 2.0

There are two buttons and one [JOYSTICK] to navigate Joule 2.0. To help navigate Joule 2.0 display and this user guide note; **bold** letters will bring special attention to Menu items as they appear on the screen. Letters appearing in all [CAPs] denote an actual button.

Navigation Overview CycleOps Joule™ 2.0

Display Actions

Button		Function
[JOYSTICK]	Press left/right	Move within a screen or change screens
	Press up/down	Move within a screen or scroll up/down screen
	Press in and release	Change metrics in dashboard, change date ranges in reports or select settings in menu
	Press and hold for 2 seconds	Initate list for changing dashboard categorysettings
[MODE]	Press and release	Change between dashboard, reports, activities, menu
	Press and release	Navigate "back" in menu mode
	Press and hold for 2 seconds	Display "Ride Paused" screen
[INTERVAL]	Press and release	Stop current interval and start next interval
	Press and hold for 2 seconds	Change dashboard to and from "Interval Mode"
[MODE] + [INTERVAL]	Press and hold for 2 seconds	Initiates finding previously paired sensors

Data File Management

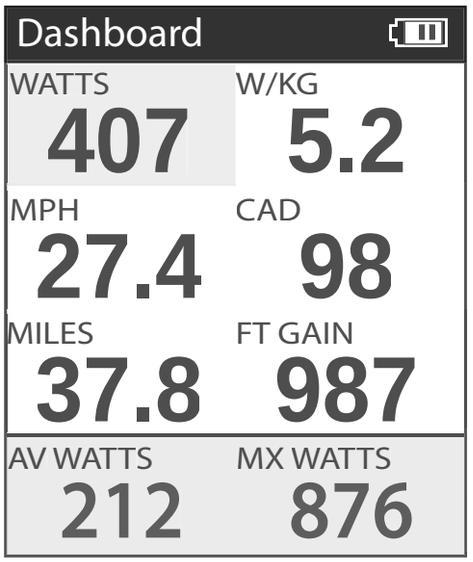
Joule 2.0 saves three types of files into memory, activities, workouts and history. Activities files contain second by second ride data for analysis by PC or Mac on software such as CycleOps PowerAgent. History files contain summary data only and are used by Joule 2.0 for calculating averages, maximums and totals for Reports. Workout files are created in PowerAgent and sent to Joule 2.0.

Whenever ride time is accumulated an activities file is created and saved automatically. A history file is generated anytime a ride is stopped and saved. Note: because history files are used by Reports for calculating averages, maximums and totals it is important to manage them carefully, only saving rides that you want to contribute to these calculations. Because Joule 2.0 acts as a mass storage device, activities and history files may also be viewed from a PC or Mac when connected via USB cable.

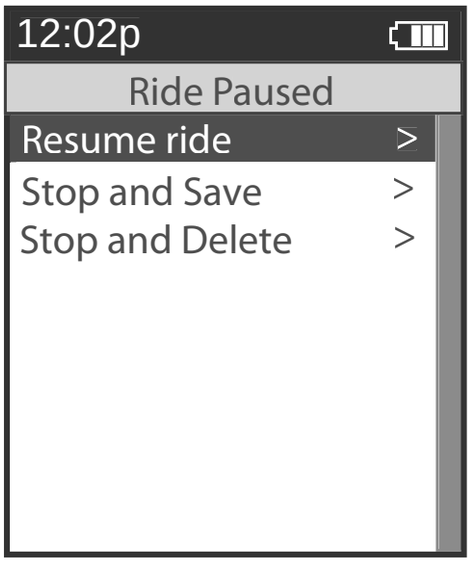
File Type	Description	Size
Activtiies	Second by second complete ride storage	1hr=150K
Workouts	Summarized ride data for reports and history	1 ride=1KB
History	Created by PowerAgent for training a precise power output, powerzone or terrain (slope).	500 segments=5KB

Pausing, Saving and/or Deleting a Ride

A ride may be paused at any time. Joule 2.0 will turn off automatically if paused for longer than the designated sleep time. See page 34 for how to change sleep time.



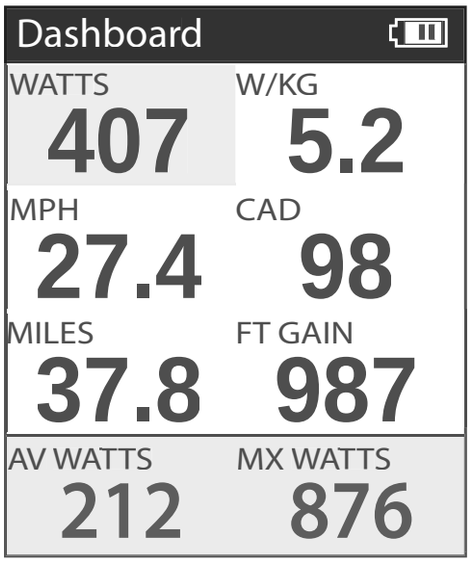
1. Press and hold [MODE] button for two seconds to access ride paused screen from any mode.



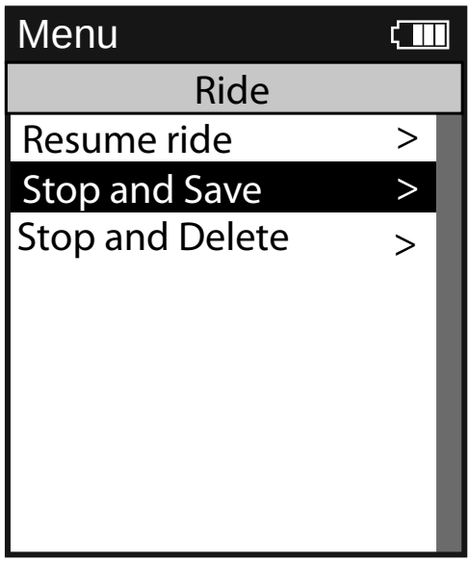
2. Press [JOYSTICK] in and release to resume ride.

Pausing, Saving and/or Deleting a Ride

Stopping and saving a ride creates a history file. History files are used for calculating averages, maximums and totals for Reports.



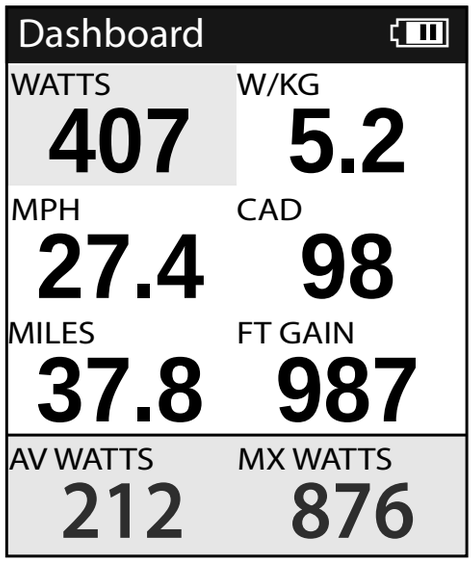
1. Hold [MODE] button for two seconds to access ride paused screen from any mode.



2. Press [JOYSTICK] up/down to highlight stop and save. Press [JOYSTICK] in and release to select.

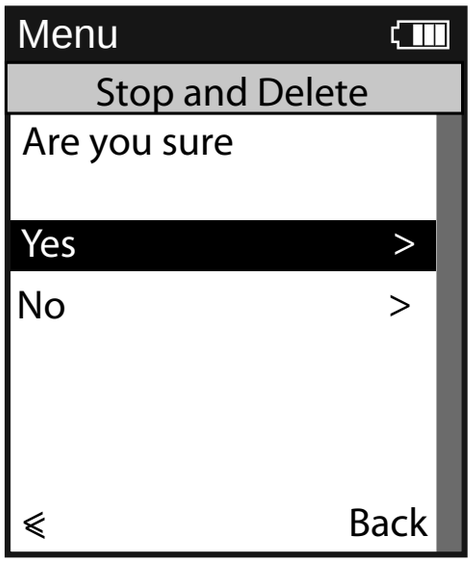
Pausing, Saving and/or Deleting a Ride

A ride may be deleted at any time. If a ride is deleted no history file is created.



1. Press and hold [MODE] button to access ride paused screen from any mode.

2. Press [JOYSTICK] up/down to highlight stop and delete. Press [JOYSTICK] in and release to select stop and delete.



3. Press [JOYSTICK] in and release to confirm deletion.

Alerts
Notifications indicated in the title bar alerting users to prepare to action step to optimize Joule 2.0 functionality.

Battery Low: indicating Joule 2.0 battery is low. Need to plug in and charge to computer or AC adapter. If one bar remains on the battery icon, there is approximately a half an hour of use left before Joule 2.0 battery dies.

Connected: indicating Joule 2.0 is connected to a computer or AC adapter and is receiving a charge. Charging may take three hours to complete.

Hub Battery Low: indicating the CycleOps PowerTap hub battery is low. Reference CycleOps PowerTap User Guide to change battery in hub.

Finding: indicatingJoule 2.0 is attempting to find activated sensors.

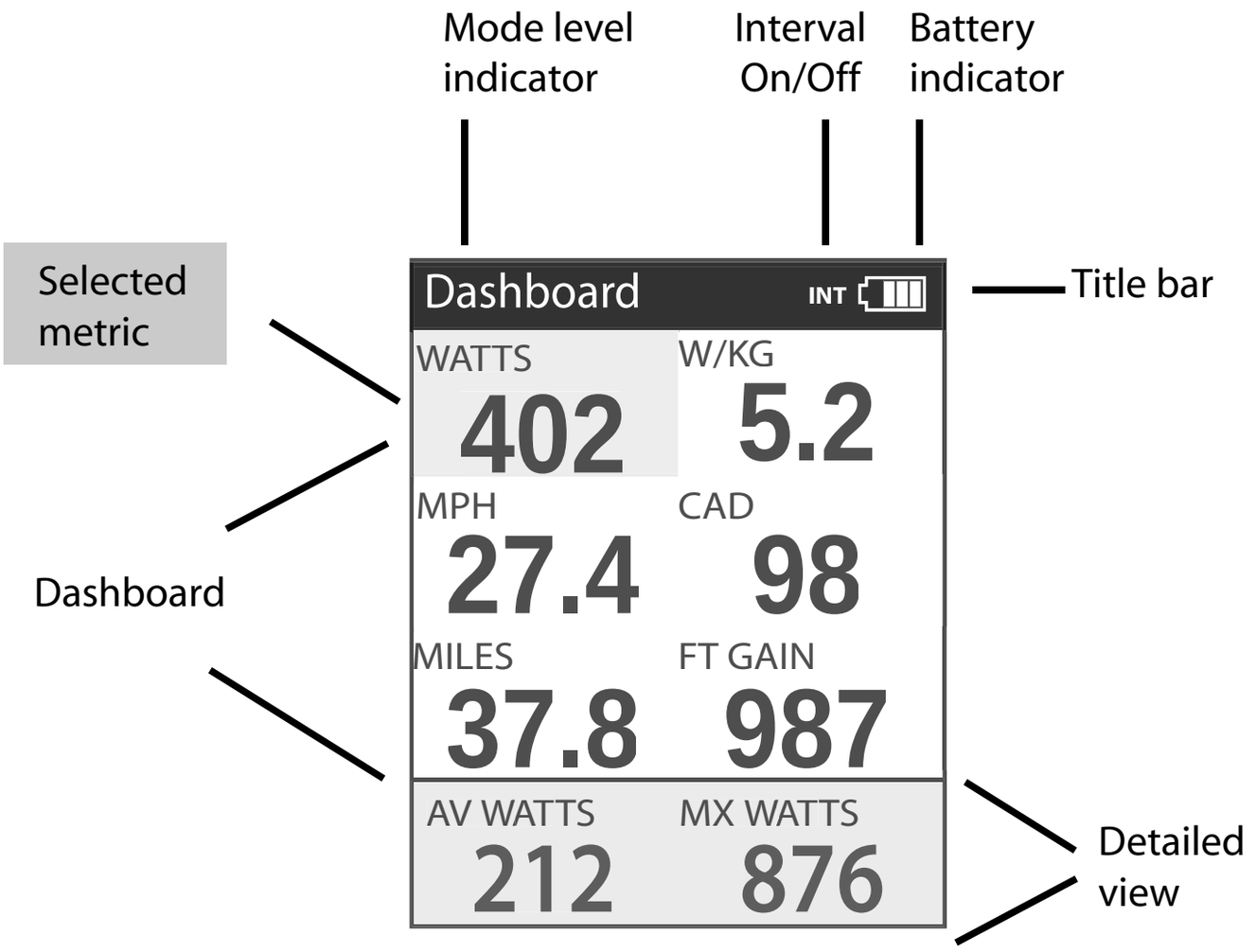
RU Lost: indicating the resistance unit that was activated and paired to Joule 2.0 has been lost.

Hub Lost: indicating the power meter that was activated and paired to Joule 2.0 has been lost.

Memory Full: indicating the memory on the Joule 2.0 has reached its limit. Insert new microSD card or delete files to create more memory.

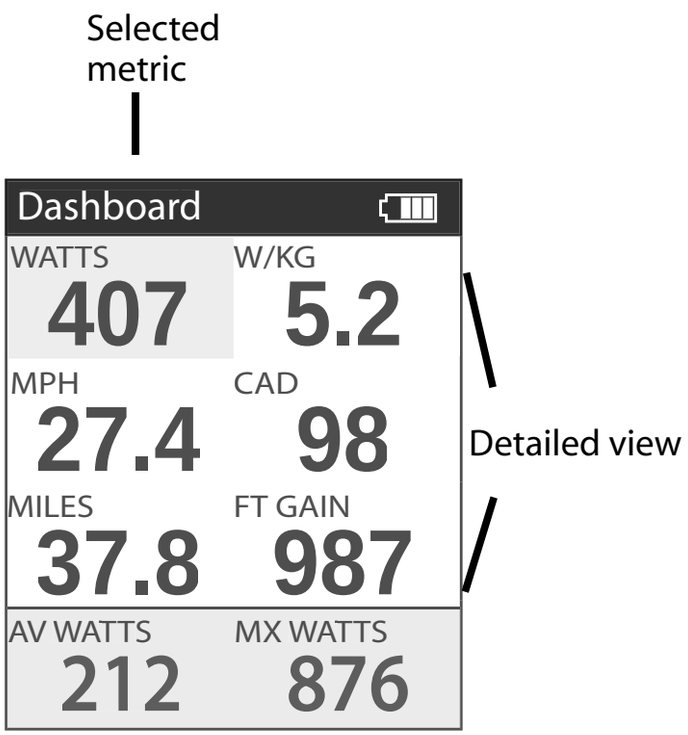
Using Dashboard Mode

Joule 2.0 has four modes of operation: dashboard, reports, activities and menu indicated by the title bar. Note: after the mode is displayed in the title bar for five seconds, the time of day will be displayed. Press and release [MODE] button to change to dashboard mode.

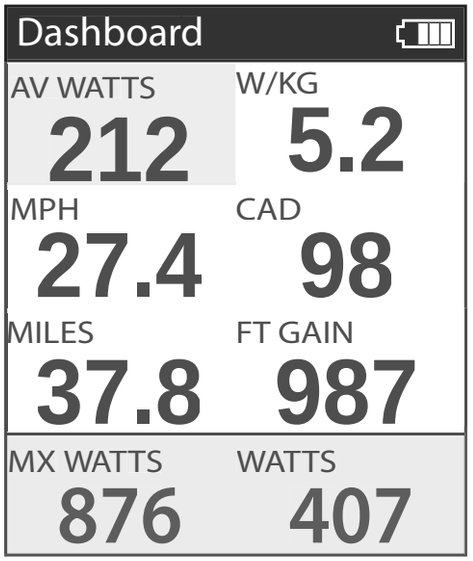


Using Dashboard Mode

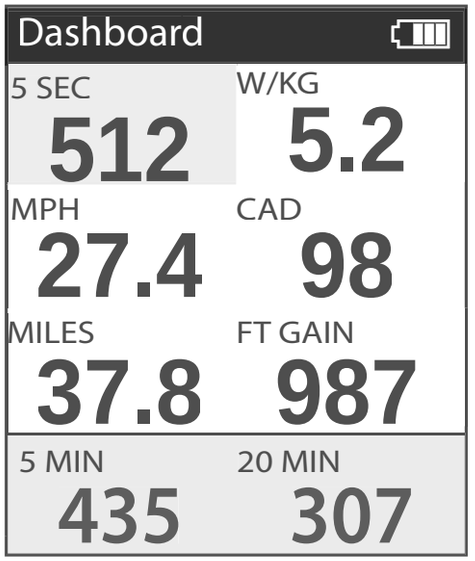
Dashboard mode shows current ride data. It displays six metrics, out of a choice of eighteen, that can be easily customized. The detailed view shows additional metrics related to the selected metric in the dashboard.



1. Press [JOYSTICK] left/right or up/down to highlight a metric. Note: when a new metric is highlighted, the detailed view changes to show related metrics.



2. Press in and release [JOYSTICK] to rotate metrics from detailed view to dashboard. (Example: watts, av watts, mx watts).



3. Press in and hold [JOYSTICK] to change the metric category displayed in the dashboard.

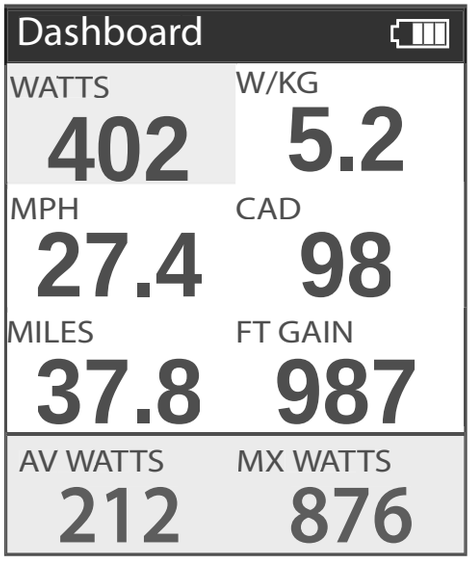
Dashboard Categories

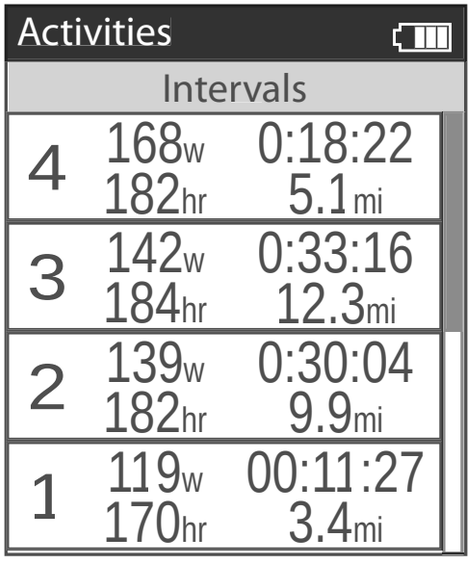
Each dashboard category is made up of three metrics. There are twelve available dashboard categories. Press and hold [JOYSTICK] to change the metric category displayed in the dashboard.

Category	Metric 1	Metric 2	Metric 3
Watts	watts WATTS 2999	average watts AV WATTS 2999	maximum watts MX WATTS 2999
Watts/kg	watts/kg W/KG 20.0	average watts/kg AV W/KG 20.0	maximum watts/kg MX W/KG 20.0
Zones	current power zone PWR ZONE 6	average power zone AV PWR ZONE 4.2	heart rate zone HR ZONE ♥ 3
Peak Power	5sec Peak Power 5 SEC 2999	5min Peak Power 5 MIN 2999	20 min Peak Power 20 MIN 2999
Scores	training stress score TSS 500.1	normalized power NORM PWR 2999	intensity factor IF 2.000
Work	kilojoules KJ 9999	kilojoules / hour KJ/HR 9999	training stress score TSS 9999
RPM	rpm CAD 250	average rpm AV CAD 250	maximum rpm MX CAD 250
Heart Rate	heart rate HR ♥250	average heart rate AV HR ♥250	maximum heart rate MX HR ♥250
Speed	current speed MPH 99.9	average speed AV MPH 99.9	maximum speed MX MPH 99.9
% Grade	current grade % GRADE 45.0	current altitude ft or m ALTITUDE FT 29999	total ascent ft or m FT GAIN 9999
VAM	vertical ascent VAM 45.0	current altitude ft or m ALTITUDE FT 29999	total ascent ft or m FT GAIN 9999
Ride	ride time RIDE TIME HR 99:59:59	ride distance MILE 99.99	time of day CLOCK PM 12:59

Intervals

Intervals may be viewed from activities mode or dashboard mode. Intervals are useful for viewing ride data specific to a section of your ride such as a hill or other period of high intensity riding.





1. Intervals can be started at any point during the ride and from any mode. Press and release [INTERVAL]. To stop the existing interval and start the next one, press and release [INTERVAL] again.

2. To view intervals from the dashboard press and hold [INTERVAL] until "INT" is displayed in the title bar. Note: All dashboard data now pertains to the active interval only.

3. To exit interval mode, press and hold [INTERVAL] again. Note: all dashboard data will now pertain to the entire ride.

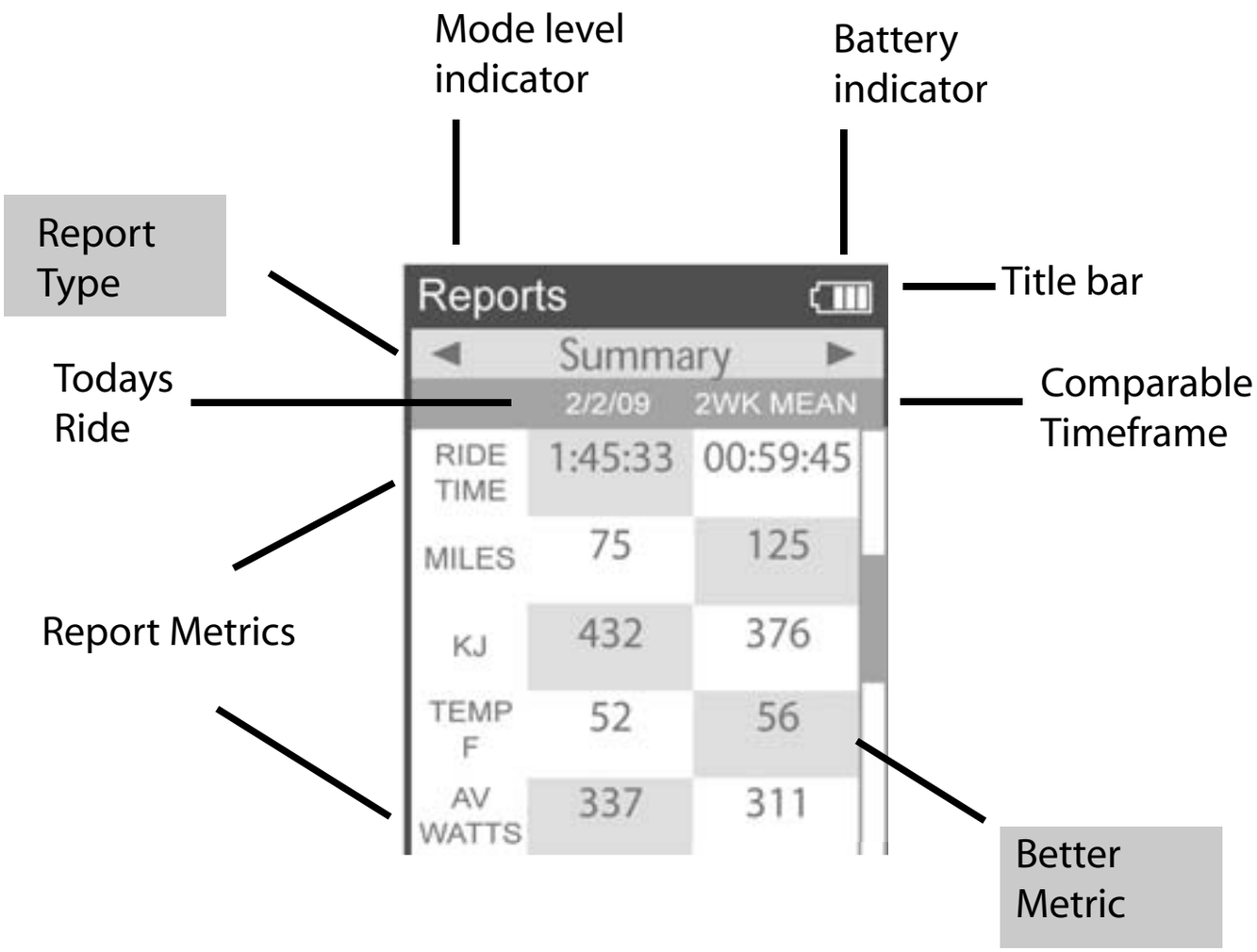
4. To view all interval data press and release [MODE] to navigate to activities mode.

Note: Activities mode shows all intervals completed with the current interval at the top of the list. Average power, heart rate, interval time and distance are displayed for each interval.

Intervals are disabled during saved workouts.

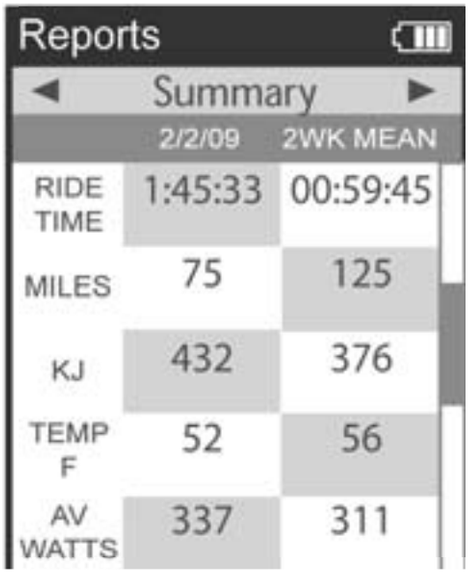
Using Reports Mode

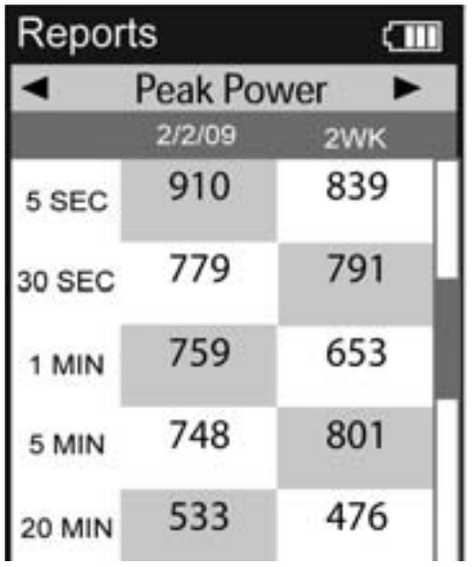
Joule 2.0 has four modes of operation: dashboard, reports, activities and menu indicated by the title bar. Note: after the mode is displayed in the title bar for five seconds, the time of day will be displayed. Press and release [MODE] button to change from dashboard mode to report mode.



Using Reports Mode

Joule 2.0 provides eight reports with an easy comparison of the current ride and historical averages so information can be seen in context. Each report contains three columns; the first column is the metric label, the second column is the data for a given metric on the current ride, the third column is the average of all rides completed over the selected date range. Note: the highlighted metrics represents the higher of the two metrics. For more information see Report Definitions for an explanation of each metric in reports from pages 31-32.





1. From dashboard mode, press and release [MODE] button. Press [JOYSTICK] left/right to change reports.

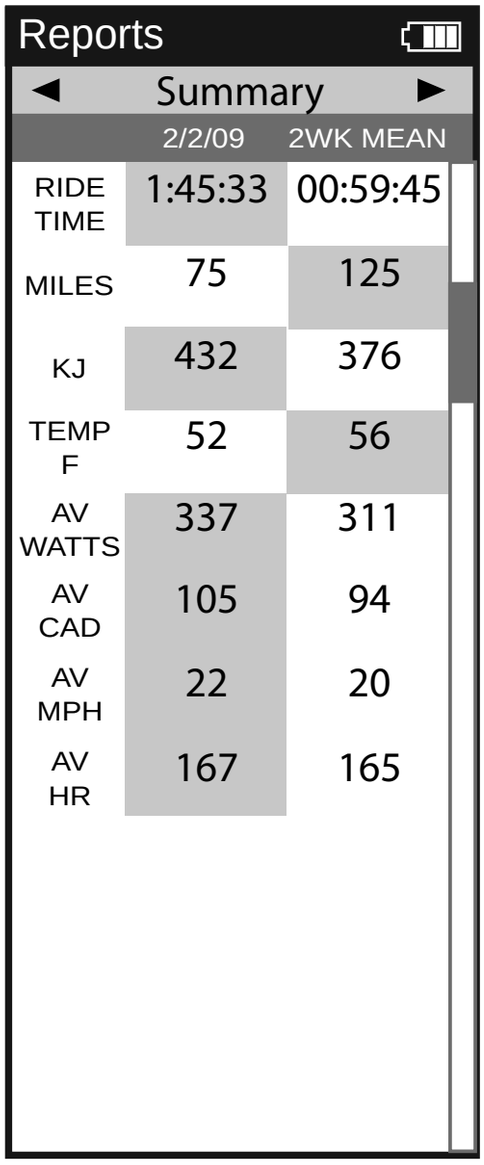
2. Press [JOYSTICK] up/down to scroll screen. Reports may also be accessed through History, see page 55.

3. Press in and release [JOYSTICK] to change date ranges from two weeks, four weeks, eight weeks, six months and twelve months.

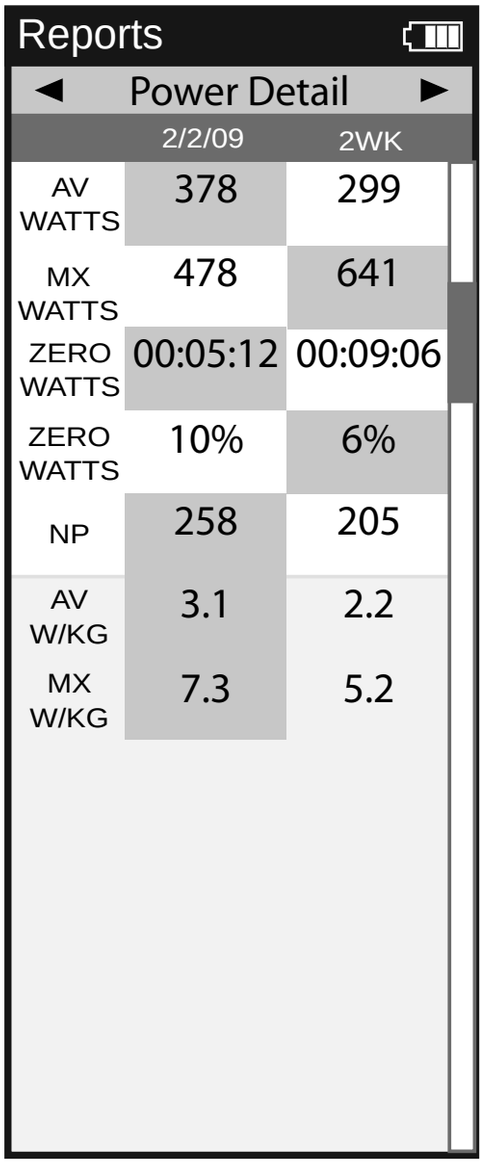
4. Move [JOYSTICK] left and right to show the other reports. There are eight available reports.

Report Details

Joule 2.0 provides eight reports that provide an easy comparison of the ride and historical averages so information can be seen in the context. For more information see Report Definitions for an explanation of each metric in reports from pages 31-32.



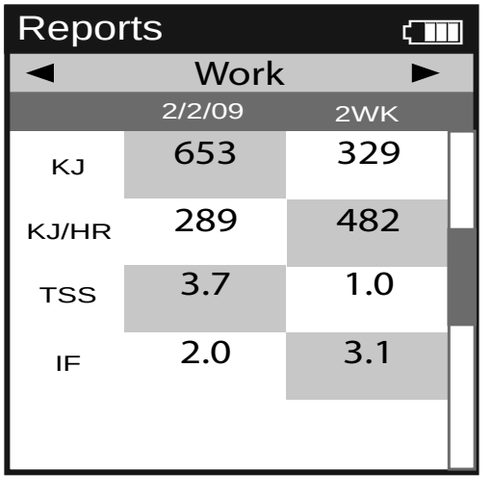
1. Basic information with minimal manipulation or calculation and how they compare to previous rides. *Note: Ride time equals time moving. Average watts is calculated without zeros and is time weighted.*



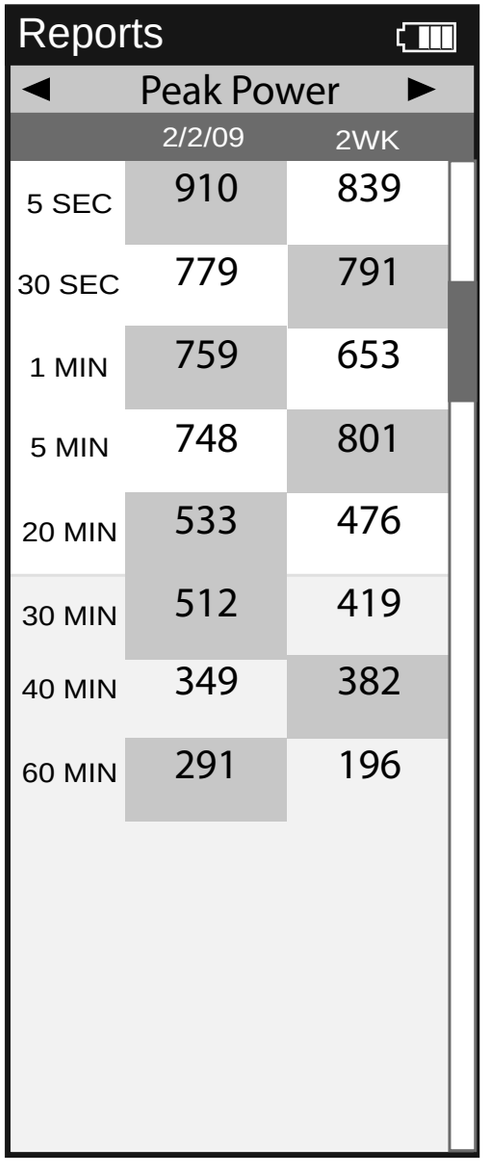
2. In depth view of power specific information for new insight into ride intensity and characteristics. Includes normalized power, watts per kilogram of body weight and time spent at zero watts.

Report Details

For more information see Report Definitions for an explanation of each metric in reports from pages 31-32.



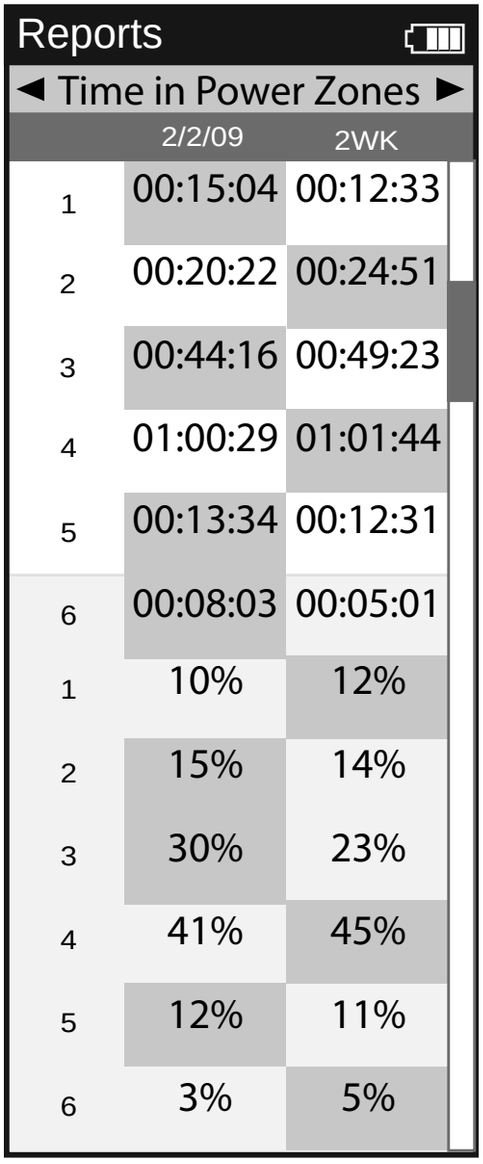
3. Key measures for quantifying work completed, including TrainingPeaks' Training Stress Score (TSS) and Intensity Factor (IF).



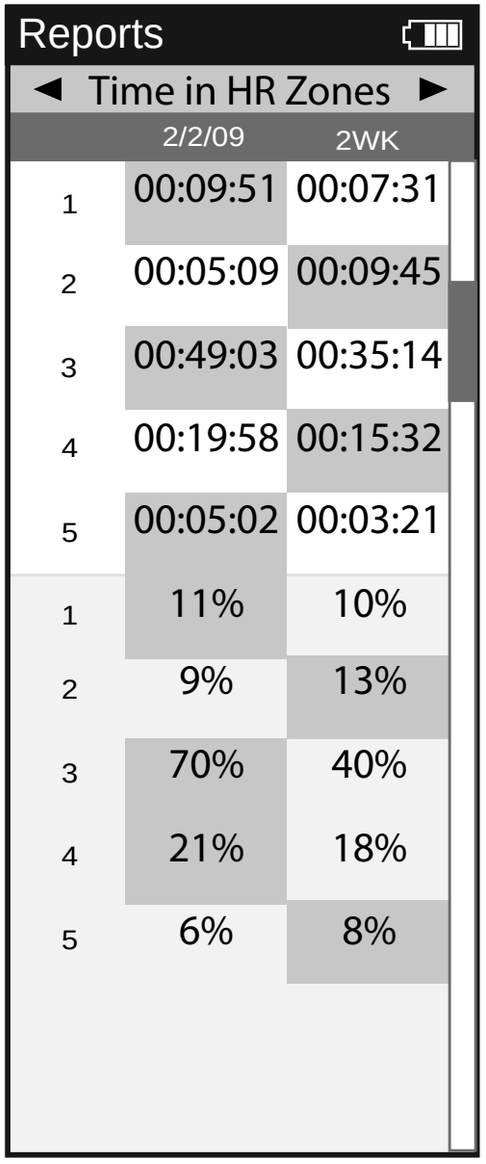
4. Full array of peak power data for indication of ride intensity at key physiological markers of current fitness compared to previous performances.

Report Details

For more information see Report Definitions for an explanation of each metric in reports from pages 31-32.



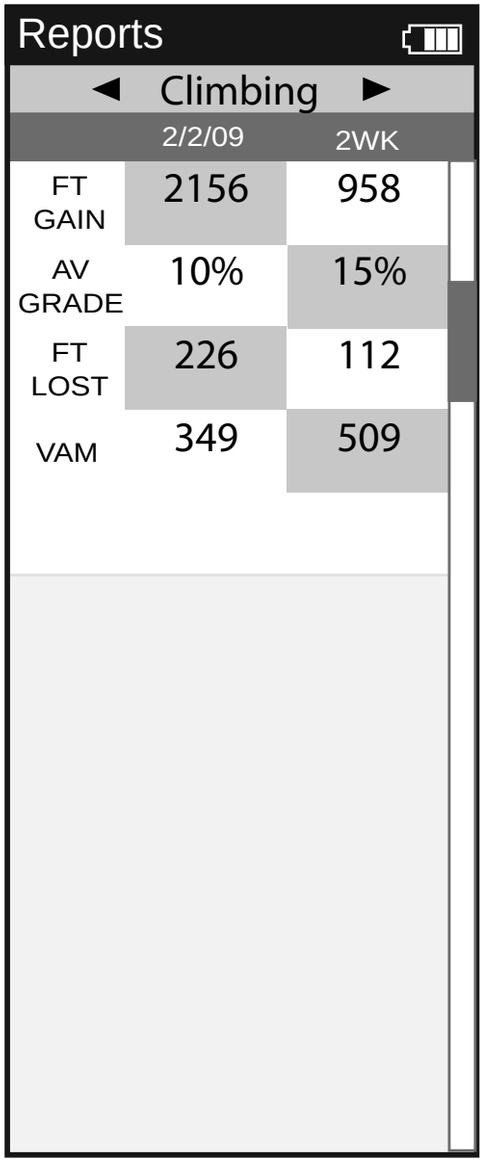
5. Time spent in physiological relevant power zones in absolute minutes and as a percent of total time.



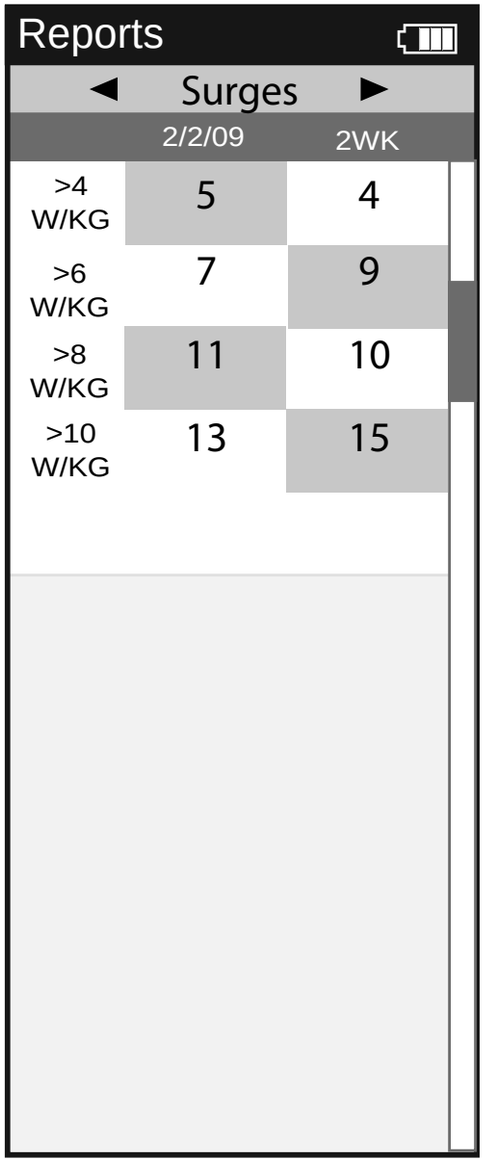
6. Time spent in physiological relevant heart rate zones in absolute minutes and as percent of total time.

Report Details

For more information see Report Definitions for an explanation of each metric in reports from pages 31-32.



7. Detailed indication of climbing including total altitude gained and lost, vertical ascent (VAM) and grade. *Note: climbing related data is only functional when riding outdoors and is subject to weather changes. See Technical Specifications on page 57.*



8. Quantification of how many accelerations occured during a ride over 4, 6, 8 and 10 watts per kilogram. Note: A surge is counted whenever three consecutive values above a watt per kilogram threshold are achieved.

Report Definitions

Summary Report

Ride Time
Time of ride defined as any time spent moving. Note: time spent stopped can be included if Joule Mode settings are changed from speed record control to heart rate record control.

MI/KM
The ride length from start to finish measured in kilometers or miles.

KJ
1. 1000 Joules. 2. A unit of energy equal to the work done by a force of 1000 newtons acting through a distance of 1 meter. 3. A measure of mechanical energy or the energy released when a force is applied to an object or body. 4. A common unit used to express the total volume or work accomplished during a given workout, ride, or exercise bout. 5. A unit or measure used to express the total training load. 6. The average power output in watts multiplied by the time in seconds divided by 1000

TEMP C/F
The current temperature measured by Joule's internal sensor.

AV WATTS
1. Average power during a ride. 2. A common unit used to express effort or intensity amongst cyclists. Note: Average calculation may or may not include zeros (time spent coasting or with no power) depending on Joule's set up. By default, zeros are included. For 2 WK, 4 WK rolling averages are time weighted over the selected period.

AV CAD
Average pedal revolutions per minute during a ride. Note: Average calculation may or may not include zeros (time spent coasting or with no power) depending on Joule's set up. By default, zeros are included. For 2 WK, 4 WK rolling averages a time weighted average over the selectable time period is used.

AV MPH/KPH
Average speed in miles per hour or kilometers per hour during a ride.

AV HR
Average heart rate in beats per minute during a ride. Note: For 2 WK, 4 WK rolling averages a time weighted average over the selectable time period is used.

Report Definitions

Power Detail Report

AV WATTS
1. Average power during a ride. 2. A common unit used to express effort or intensity amongst cyclists. Note: Average calculation may or may not include zeros (time spent coasting or with no power) depending on Joule's set up. By default, zeros are included. For 2 WK, 4 WK rolling averages a time weighted average over the selectable time period is used.

MX WATTS
Maximum power in watts during a ride. Note: For 2 WK, 4 WK rolling averages a time weighted average over the selectable time period is used.

ZERO WATTS
Cumulative ride time when Power is zero displayed in absolute minutes or as percentage of total ride time.

NORM POWER
An estimate of the power that you could have maintained for the same physiological "cost" if your power output had been perfectly constant developed by Training Peaks.

AV W/KG
Average power in watts divided by rider weight in kg during a ride.

MX W/KG
Maximum power in watts divided by rider weight in kg during a ride.

Report Definitions

Work Report and Peak Power Report

KJ

1. 1000 Joules. 2. A unit of energy equal to the work done by a force of 1000 newtons acting through a distance of 1 meter. 3. A measure of mechanical energy or the energy released when a force is applied to an object or body. 4. A common unit used to express the total volume or work accomplished during a given workout, ride, or exercise bout. 5. A unit or measure used to express the total training load. 6. The average power output in watts multiplied by the time in seconds divided by 1000

KJ/HR

Average Kj's per hour of riding during a ride

TSS

Training Stress Score estimating the total amount of glycogen burned on a ride.

IF

Ratio of the normalized power to threshold power. Joule uses the mid-point between the threshold zone (zone 3) and the race pace zone (zone 4) as the threshold power value.

Peak Power

The highest average power output that can be held for a given duration. 2. For most individuals a peak sustainable power or peak power output lasting 4 to 8 minutes is equivalent to an intensity that elicits their VO2 max, or maximal capacity to consume oxygen. 3. For most individuals a peak sustainable power output lasting 20 to 40 minutes is equivalent to an intensity that elicits their lactate threshold or a value of blood lactate 2 to3 mM above their baseline blood lactate. 4. For most individuals a peak sustainable power output lasting 40 minutes to 2 hours is equivalent to an intensity that elicits their lactate threshold, or a value of blood lactate just above to 1 mM above their baseline blood lactate. 5. In cycling, the peak sustainable power for any given duration is analogous to their best performance for a given time. For example, a runner might have a personal best of 5 minutes in a mile run and 35 minutes in a 10 km run, whereas a cyclist might have a personal best or peak sustainable power of 400 watts for 5 minutes and 340 watts for 35 minutes.

Report Definitions

Time in Zones Report

Training Zones

1. Discrete bins or intervals specific to a particular energy or physiological system. From short maximal efforts to long maximal efforts these energy systems run along a continuum from anaerobic to aerobic metabolic pathways. Common reference points for this continuum include the power at lactate threshold and power at VO2 max.

Recovery Zone (Zone 1)

1. An easy exercise intensity where there is minimal stress or strain on the body. 2. On a 1 to 10 rating of perceived exertion scale, the recovery zone corresponds to a 1 to 2 or "really easy" to "easy". 3. On a 6 to 20 rating of perceived exertion scale, the recovery zone corresponds to a 6 to 10 or "very very light" to "very light." 4. An exercise intensity dependent solely on aerobic metabolism of primarily fat. 5. An exercise intensity that can be held for an indefinite time frame.

Endurance Zone (Zone 2)

1. A moderate exercise intensity where there is some stress or strain on the body 2. On a 1 to 10 RPE scale, an intensity corresponding to 3 to 4 or "moderate" to "sort of hard". 3. On a 6 to 20 RPE scale, an intensity corresponding to a 10 to 13 or "fairly light" to "somewhat hard." 4. An exercise intensity depending on the aerobic metabolism of both fat and carbohydrate. 5. An exercise intensity that can be held as long as the athlete were supplied with an influx of carbohydrate (i.e., allowed to eat).

Lactate Threshold (LT) Zone (Zone 3)

1. A hard intensity zone marked by a sudden increase in breathing rate. 2. On a 1 to 10 RPE scale, an intensity corresponding to a 5 to 7 or "hard" to "really hard." 3. On a 6 to 20 RPE scale, an intensity corresponding to a 13 to 16 or "somewhat hard" to "very hard". 4. A range of exercise intensity beginning at a slight inflection or rise in the blood lactate over a resting baseline to an intensity corresponding with a blood lactate 2 to 3 mM above a resting baseline. 5. A demarcation between aerobic metabolism to a mix of anaerobic and aerobic metabolism. 6. An all out exercise intensity that can be held between 40 minutes to 2 hours depending on the availability of stored carbohydrate or glycogen within the body.

Report Definitions

Time in Zones Report...continued

Race Pace Zone (Zone 4)

1. An extremely hard or all out intensity zone. 2. On a 1 to 10 RPE scale, an intensity corresponding to a 7 to 8 or "really hard" to "really really hard." 3. On a 6 to 20 RPE sale, an intensity corresponding to a 16 to 18 or "very hard" to "very very hard." 4. An exercise intensity dependent primarily on the aerobic and anaerobic metabolism of carbohydrate. 5. An all out exercise intensity that can be held between 10 minutes to 30 minutes.

Max Zone (Zone 5)

1. An all out or maximal intensity zone. 2. On a 1 to 10 RPE scale, an intensity corresponding to a 9 to 10 or "really really hard" to "maximal." 3. On a 6 to 20 RPE scale, an intensity corresponding to an 18 to 20, or "very very hard" to "maximal." 4. An exercise intensity that elicits the causes the body to reach its maximal capacity to consume oxygen (i.e., an exercise intensity that elicits VO2 max). 5. An all out or maximal effort that can be held between 2 to 8 minutes or an average of 4 minutes.

Supra-Max Zone (Zone 6)

1. A very short, all out effort that exceeds the power output associated with VO2 max or a person's max zone. 2. An exercise intensity that is almost entirely dependent on the anaerobic metabolism of stored ATP, Phosphagens, and carbohydrates. 3. An all out effort lasting 1 second to 2 minutes.

Report Definitions

Climbing and Surges Report

M/FT GAIN
The total vertical distance in feet or meters traveled or climbed over a given distance ridden.

AV% GRADE
The rise or vertical increase in elevation divided by the run or horizontal distance traveled multiplied by 100 (rise ÷ run x 100).

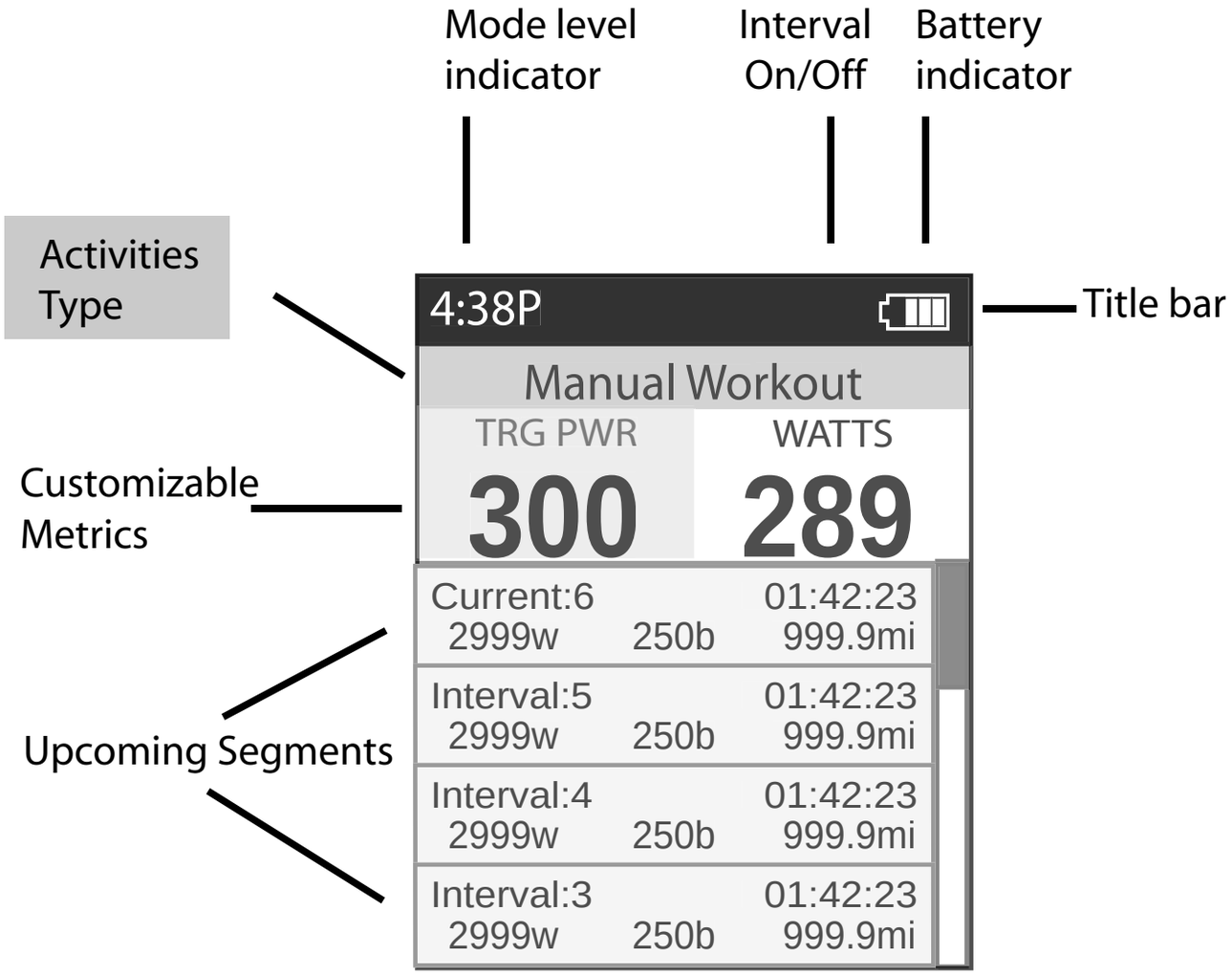
M/FT LOST
The total vertical distance in feet or meters descended over a given distance ridden.

VAM
1. The rate of vertical ascent in meters per hour. Note: At an 8% grade, a rate of ascent of 1800 meters per hour requires a power output of 6.3 watts per kg and is considered the upper limit for climbing speed in professional cyclists.

Surges
A surge is a sudden, short acceleration lasting a minimum of 3 seconds within a particular w/kg zone. The value is simply displayed as the number of times this occurs per watts/kg zone. Once a surge is recorded in a w/kg zone, the w/kg value must drop at least 0.1 w/kg below the minimum zone value before a positive increase in value back into that zone can be considered a new surge.

Using Activities Mode

Joule 2.0 has four modes of operation: dashboard, reports, activities and menu indicated by the title bar. Note: after the mode is displayed in the title bar for five seconds, the time of day will be displayed. Press and release [MODE] button to change from dashboard mode to report mode to activites mode.

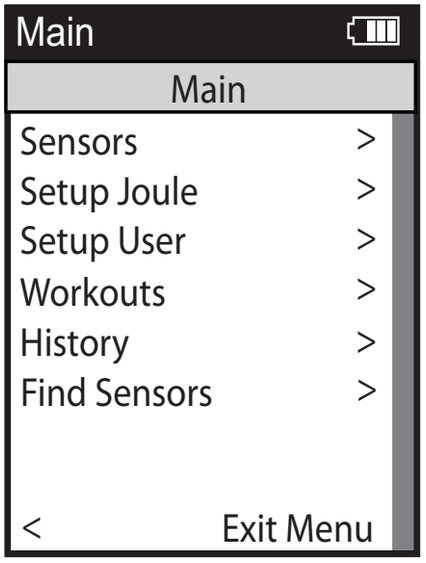


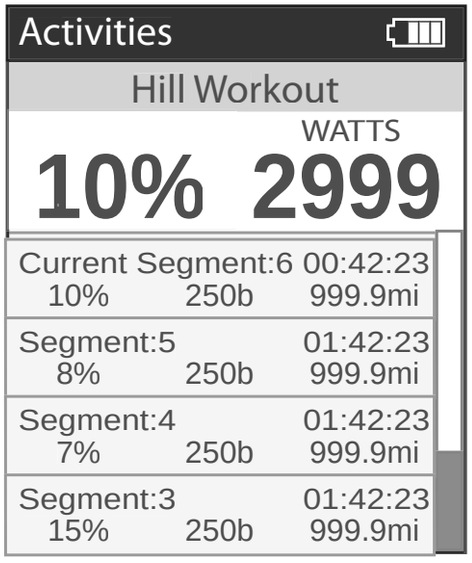
Using Workouts

Joule 2.0 offers two types of workouts, manual and saved, each managed in the Activities Mode. Manual workouts may only be performed with a CycleOps 400 Pro indoor cycle or PowerBeam Pro trainer. Saved workotus are created using PowerAgent software and transferred to Joule 2.0 Both workout types are helpful for making sure a specific workout plan is followed by displaying the workout in a series of segments with target intenisty and rest indicated.

Using Manual Workouts with CycleOps 400 Pro Indoor Cycle

The controlled resistance technology offered on the CycleOps 400 Pro indoor cycle allows workout intensity to be precisely managed by targeting slope or a specific power output.





Workouts can be ridden in dashboard mode and activities mode.

1. Press and release [MODE] until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **Workouts**. Press [JOYSTICK] in and release to select **Workouts**.

3. If Joule 2.0 has been paired to the 400 Pro resistance unit a manual workout will be started automatically once the resistance unit is found by Joule 2.0. For more information on pairing and finding sensors please refer to page 56. It is also possible to select manual workout by selecting workouts from Menu mode and then manual workout.

4. Press [JOYSTICK] up/down to adjust the target power from any mode once a manual workout is started in 10 watt increments from 30 watts to 1000 watts. Note: The 400 Pro will automatically adjust the resistance to match the target power output. Power is a combination of speed and torque. Because of this, you experience less resistance the faster you pedal, keeping your power output at the targeted level. Not all power levels are available at all speeds. When the 400 Pro cannot add any more resistance, you should speed up to achieve the target power. When the 400 Pro cannot remove any more resistance you should slow down to achieve the target power.

Using Manual Workouts with CycleOps 400 Pro Indoor Cycle...continued

Gear Ratios

Chainring	Sprocket	Display Gear	Difficulty
50	10	1	Hardest
53	11	2	Harder
50	11	3	Harder
50	12	4	Harder
50	13	5	Harder
50	14	6	Harder
50	15	7	Harder
50	11	8	Harder
34	17	9	Harder
50	12	10	Harder
34	19	11	Harder
34	14	12	Easier
50	15	13	Eaiser
34	23	14	Easier
34	17	15	Easier
34	19	16	Easier
34	21	17	Easier
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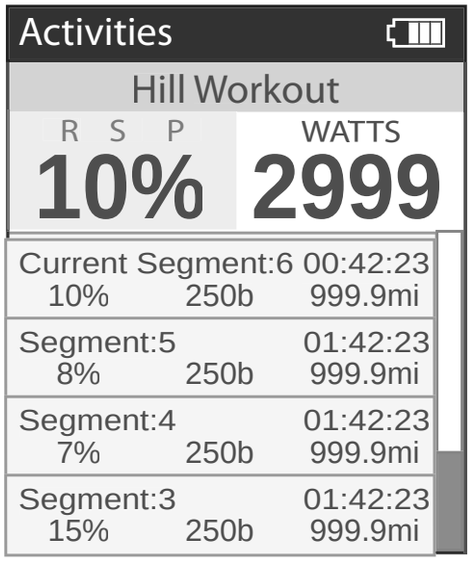
34	25	19	Easier
34	27	20	Easier
34	30	21	Easier
34	34	22	Easiest



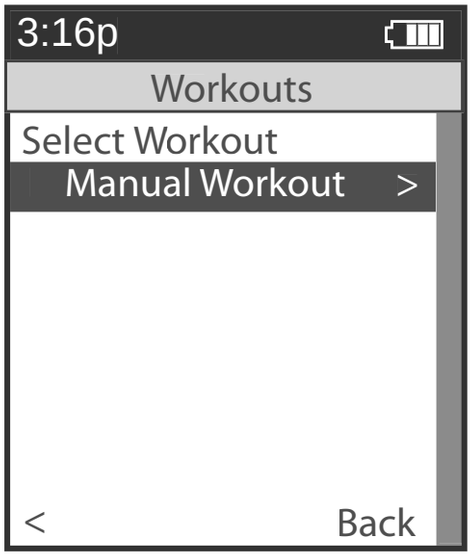
5. Press [JOYSTICK] in and release to change the resistance type from target power to target slope. Slope measures grade steepness of your simulated climb. You can choose a grade between 0 and 25. The higher the number, the steeper the slope you're climbing. While in slope mode, the 400 Pro provides the resistance for the selected slope at whatever speed you're riding. The faster you pedal, the more resistance you'll need to overcome, just like riding up an actual hill. The resistance the 400 Pro simulates is calculated considering the power needed to climb the target slope on a road bike with slick tires and the user weight saved in Joule's User Setup. For information on setting up user weight see pages 66-67 or connect Joule to PowerAgent software to adjust user weight.

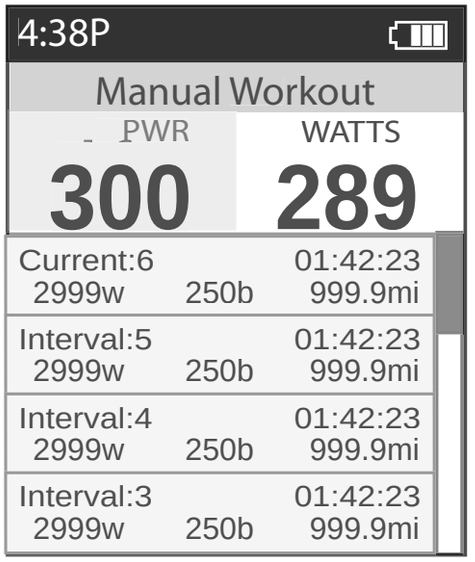
6. Press [JOYSTICK] in and release again to change from target slope to gearing. The gearing setting uses the previously set target slope but allows you to change the gear ratio simulated by the 400 Pro. This is useful for understanding what gear combination is best for you on various slopes so you can train for your goal terrain. The gears and ratios simulated by the 400 Pro are listed above:

7. Press and release [INTERVAL] at anytime during a manual workout to start a new interval and end a previous interval. To review intervals during a manual workout, press [MODE] to navigate to Activities Mode and then pess the [JOYSTICK] left/right to highlight the intervals then press [JOYSTICK] up/down to scroll list.

Using Manual Workouts with CycleOps PowerBeam Pro Trainer

The controlled resistance technology offered on the CycleOps PowerBeam Pro trainer allows workout intensity to be precisely managed by targeting slope or a specific power output.





1. Press and release [MODE] until **Main** mode is displayed.

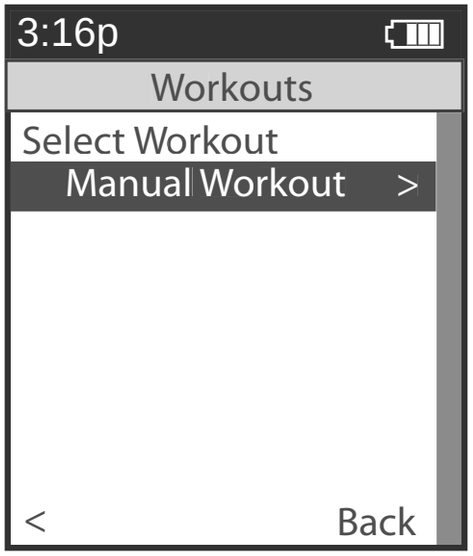
2. Press [JOYSTICK] up/down to highlight **Workouts**. Press [JOYSTICK] in and release to select **Workouts**.

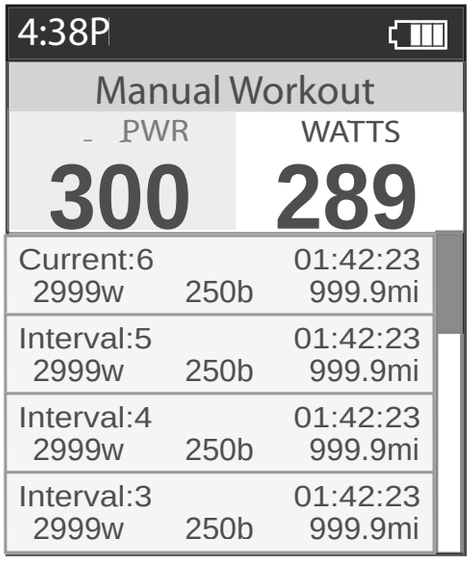
3. If Joule 2.0 has been paired to the PowerBeam Pro resistance unit a manual workout will be started automatically once the resistance unit is found by Joule 2.0 and speed is detected. For more information on pairing and finding sensors please refer to pages 48-54.

4. Press the [JOYSTICK] up/down to adjust the target power from any mode once a manual workout is started in 10 watt increments from 30 watts to 1000 watts. Note: The PowerBeam Pro will automatically adjust the resistance to match the target power output. Power is a combination of speed and torque. Because of this, you experience less resistance the faster you pedal, keeping your power output at the targeted level. Not all power levels are available at all speeds.

5. When the PowerBeam Pro cannot add any more resistance, you should speed up to achieve the target power. When the PowerBeam Pro cannot remove any more resistance you should slow down to achieve the target power.

Using Manual Workouts with CycleOps PowerBeam Pro Trainer...continued





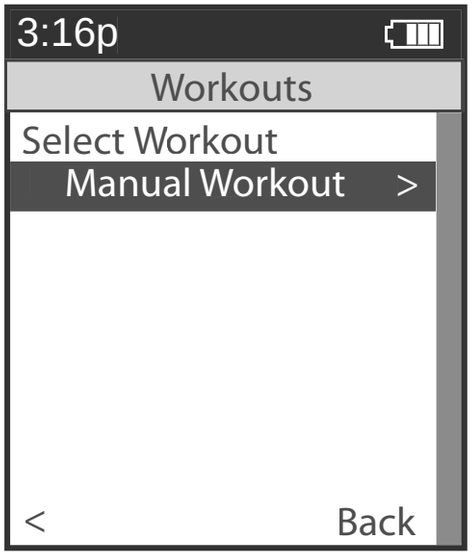
6. Press [JOYSTICK] in and release to change the resistance type from target power to target slope. Slope measures grade steepness of your simulated climb. You can choose a grade between 0 and 10 for the slope. The higher the number, the steeper the slope you're climbing. While in slope mode, the PowerBeam Pro provides the resistance for the selected slope at whatever speed you're riding. The faster you pedal, the more resistance you'll need to overcome, just like riding up an actual hill. The resistance the PowerBeam Pro simulates is calculated considering the power needed to climb the target slope on a road bike with slick tires and the user weight saved in Joule's User Setup. For information on setting up user weight see pages 66-67 or connect Joule to PowerAgent software to adjust user weight.

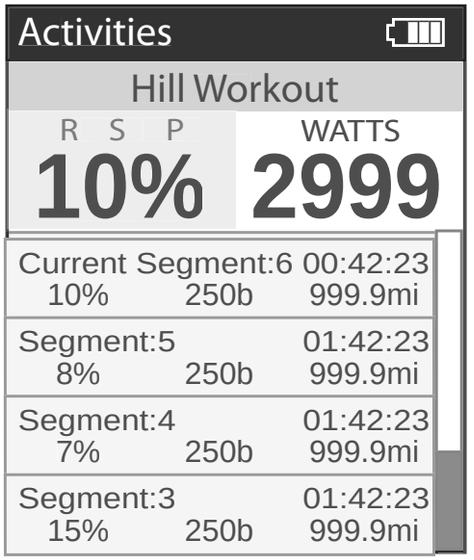
7. Shift gears on your bicycle to adjust the intensity at the target slope.

8. Press in and release INTERVAL] at anytime during a manual workout to start a new interval and end a previous interval. To review intervals during a manual workout, press [JOYSTICK] left/right to highlight the intervals then press [JOYSTICK] up/down to scroll list.

Using Saved Workouts with CycleOps 400 Pro Indoor Cycle

Workouts may be created in PowerAgent software and saved to Joule for use on the 400 Pro indoor cycle. The advantage of saved workouts over manual workouts is that the resistance will change automatically based on the saved time or distance of each segment. This is helpful for duplicating a specific course you are training for. Note: Resistance target and type can be changed during a ride in a saved workout in the same way as a manual workout.





1. Press and release [MODE] until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **Workouts**. Press [JOYSTICK] in and release to select **Workouts**.

3. Press [JOYSTICK] up/down to highlight the desired saved workout. Press [JOYSTICK] in and release to select the desired saved workout.

4. Once the saved workout is selected, Joule 2.0 will display activities mode and the segments associated with the saved workout. The first segment of the workout will begin as soon as pedaling begins.

5. Pressing [JOYSTICK] up/down adjusts the target resistance from any mode once a saved workout is started. Note: The 400 Pro will automatically adjust the resistance to match the target resistance from the saved workout. Power is a combination of speed and torque. Because of this, you experience less resistance the faster you pedal, keeping your power output at the targeted level. Not all power levels are available at all speeds. When the 400 Pro cannot add any more resistance, you should speed up to achieve the target power. When the 400 Pro cannot remove any more resistance you should slow down to achieve the target power.

Using Saved Workouts with CycleOps 400 Pro Indoor Cycle...continued

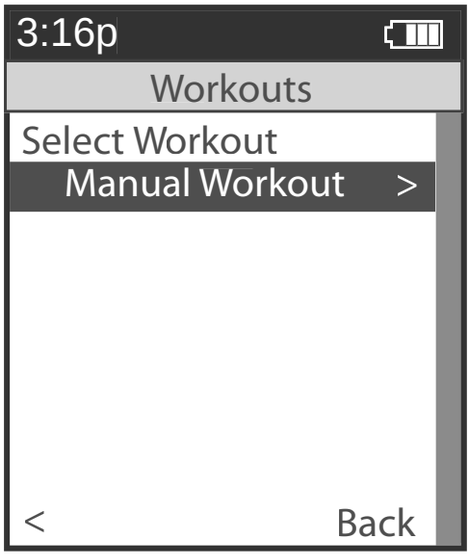
Slope measures grade steepness of your simulated climb. You can choose a grade between 0 and 25 for the slope. The higher the number, the steeper the slope you're climbing. While in slope mode, the 400 Pro provides the resistance for the selected slope at whatever speed you're riding. The faster you pedal, the more resistance you'll need to overcome, just like riding up an actual hill. The resistance the 400 Pro simulates is calculated considering the power needed to climb the target slope on a road bike with slick tires and the user weight saved in Joule's User Setup. For information on setting up user weight see pages 66-67 or connect Joule to PowerAgent software to adjust user weight.

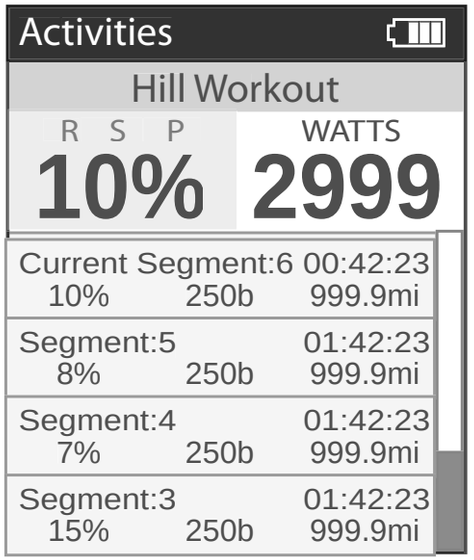
6. Press [JOYSTICK] in and release to change from target slope to gearing. The gearing setting uses the previously set target slope but allows you to change the gear ratio simulated by the 400 Pro. This is useful for understanding what gear combination is best for you on various slopes so you can train for your goal terrain. The gears and ratios simulated by the 400 Pro are listed on page 40.

7. When a saved workout is completed each saved segment is automatically converted to an interval. Press [JOYSTICK] left/right to highlight the intervals. Press [JOYSTICK] up/down to scroll up/down and review the intervals. Note: when a saved workout is completed the target resistance defaults to 100 watts. Note: Intervals are disabled during while riding saved workouts.

Using Saved Workouts with CycleOps PowerBeam Pro Trainer

Workouts may be created in PowerAgent software and saved to Joule for use on the PowerBeam Pro trainer. The advantage of saved workouts over manual workouts is that the resistance will change automatically based on the saved time or distance of each segment created in PowerAgent software. This is helpful for duplicating a specific course you are training for. Note: Resistance target and type can be changed in a saved workout in the same way as a manual workout.





1. Press and release [MODE] until **Main** mode is displayed.

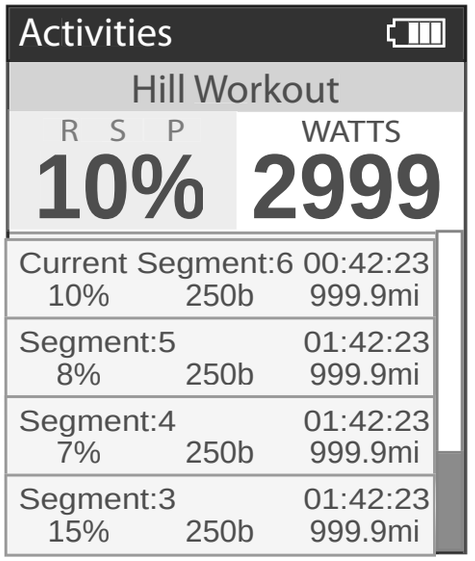
2. Press [JOYSTICK] up/down to highlight **Workouts**. Press [JOYSTICK] in and release to select **Workouts**.

3. Press [JOYSTICK] up/down to highlight the desired saved workout. Press [JOYSTICK] in and release to select the desired saved workout.

4. Once the saved workout is selected, Joule 2.0 will display Activities Mode and the segments associated with the saved workout. The first segment of the workout will begin as soon as pedaling begins.

5. Pressing [JOYSTICK] up/down adjusts the target resistance from any mode once a saved workout is started Note: The PowerBeam Pro will automatically adjust the resistance to match the target power output. Power is a combination of speed and torque. Because of this, you experience less resistance the faster you pedal, keeping your power output at the targeted level. Not all power levels are available at all speeds. When the PowerBeam Pro cannot add any more resistance, you should speed up to achieve the target power. When the PowerBeam Pro cannot remove any more resistance you should slow down to achieve the target power.

Using Saved Workouts with CycleOps PowerBeam Pro Trainer...continued



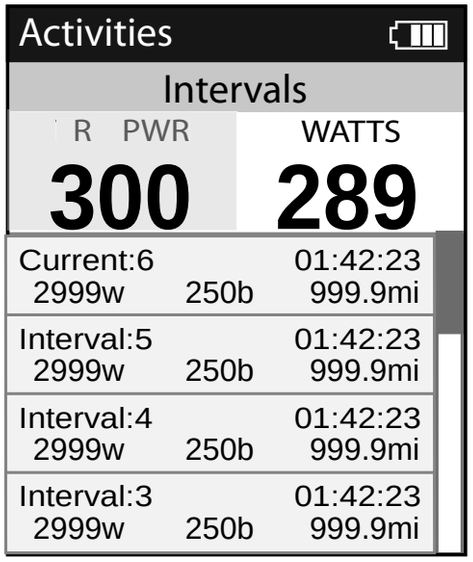
Slope measures grade steepness of your simulated climb. You can choose a grade between 0 and 10 for the slope. The higher the number, the steeper the slope you're climbing. While in slope mode, the PowerBeam Pro provides the resistance for the selected slope at whatever speed you're riding. The faster you pedal, the more resistance you'll need to overcome, just like riding up an actual hill. The resistance the PowerBeam Pro simulates is calculated considering the power needed to climb the target slope on a road bike with slick tires and the user weight saved in Joule's User Setup. For information on setting up user weight see pages 66-67 or connect Joule to PowerAgent software to adjust user weight.

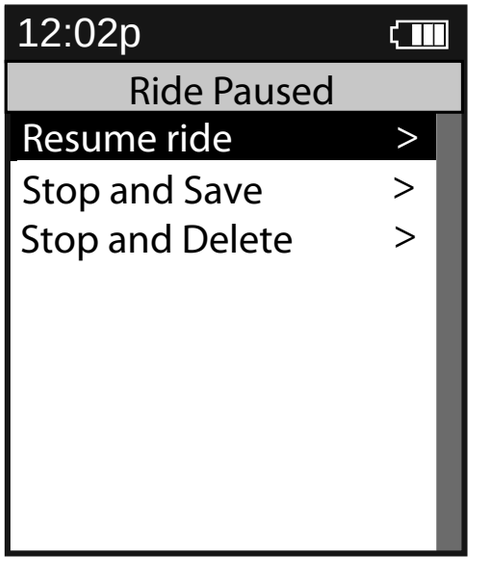
6. Shift gears on your bicycle to adjust the intensity at the target slope.

7. When a saved workout is completed each saved segment is automatically converted to an interval. Press [JOYSTICK] left/right to highlight the intervals. Press [JOYSTICK] up/down to scroll up/down and review the intervals. Note: when a saved workout is completed the target resistance defaults to 100 watts. Note: Intervals are disabled during while riding saved workouts.

Pausing, Saving or Deleting a Workout

A workout, like any ride can be paused, saved or deleted.





1. Press and hold [MODE] button to access **Ride Paused** screen.

2. Press [JOYSTICK] up/down to highlight **Pause, Stop and Save or Stop and Delete** workout. Press [JOYSTICK] in and release to save changes.

Note: there will be a confirmation screen before deleting a ride. Stop and save will stop the workout and save it to History.

Setting Up Power Sensors

Joule 2.0 is compatible with many ANT+ sensors, each having a unique code. A sensor is defined as any ANT + compatible power meter, cadence sensor, speed sensor, heart rate strap and CycleOps resistance unit. Joule 2.0 needs to be paired to each sensor to ensure proper functionality. Common CycleOps power sensors include the PowerTap hub, 300 Pro and 400 Pro indoor cycles. Once set up, sensors can be managed using PowerAgent software. Note: if you purchased a CycleOps 200 Pro, 300 Pro, 400 Pro indoor cycle or PowerBeam trainer all available sensors have been paired at the factory.

1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] in and release to select **Sensors.**

3. Press [JOYSTICK] in and release to select **Power Sensor**.

4. Press [JOYSTICK] up/down to highlight. **Add Power Meter** and **click to select.** For CycleOps Pro Series indoor cycles select Add IC Power.

5. Make sure the power sensor is awake and isolated from other active sensors by 65 feet/20 meters. For PowerTap and IC Power sensors rotate the hub/wheel at least one revolution. For ANT+ sensors see that sensor's user guide for information on waking up the sensor.

6. Press the [JOYSTICK] in and release to **Start Pairing**. Pairing may take up to 60 seconds. Once pairing is successful, the sensor ID will be displayed. The sensor is automatically activated after successfully pairing.

7. Press [JOYSTICK] up/down to highlight **Name**. Press [JOYSTICK] in and release to select name and change the name of the paired power sensor.

8. For PowerTap sensors only, press [JOYSTICK] up/down to highlight the wheel circumference and press [JOYSTICK] in and release to select wheel circumference. Press [JOYSTICK] up/down to change wheel circumference. Press JOYSTICK in and release to save changes. For a list of common wheel circumferences see FAQ section.

Setting Up Power Sensors...continued.

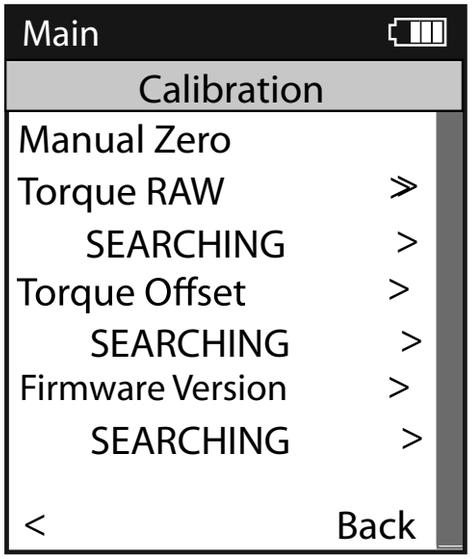
9. Press [JOYSTICK] up/down to highlight **Auto Zero <Y** or **N>.** Press [JOYSTICK] in and release to select **Auto Zero <Y** or **N>.**. Press [JOYSTICK] up/down to change **Auto Zero <Y** or **N>.**. Note: Auto Zero setting should remain set to Yes in all cases except when using a PowerTap Pro Track hub.

10. Once a sensor has been paired and activated Joule 2.0 will automatically find the active sensor whenever it is turned on.

Note: multiple sensors can be stored by Joule 2.0 but only one can be active per sensor category at a given time.

Power Sensor Manual Zero

Like a kitchen scale, it is possible for power sensors to incur an offset that needs to be zeroed. This can happen due to large temperature changes which effect the material the power sensors are attached to and often results in power being displayed even while coasting.



1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] in and release to select **Sensors**.

3. Press [JOYSTICK] in and release to select **Power Sensor.**

4. Press [JOYSTICK] up/down to highlight the Active Sensor. Press [JOYSTICK] in and release to select the Active Sensor. Note active sensor is designated by a check mark next to the sensor name in the sensor list.

5. Make sure the power sensor is awake. For PowerTap and IC Power sensors rotate the hub/wheel at least one revolution. For ANT+ sensors see that sensor's user guide for information on waking up the sensor.

6. Press [JOYSTICK] up/down to highlight **Manual Zero**. Press [JOYSTICK] in and release to select **Manual Zero**.

7. The raw torque value, offset and firmware version will be shown. If the raw value and offset value does not match a manual zero should be performed.

8. Press [JOYSTICK] up/down to highlight **Manual Zero.** Press [JOYSTICK] in and release to perform **Manual Zero**.

Setting up Cadence Sensors

Joule 2.0 is compatible with many ANT+ cadence sensors, each having a unique code. A sensor is defined as any ANT + compatible power meter, cadence sensor, speed sensor, heart rate strap and CycleOps resistance unit. Joule 2.0 needs to be paired to each sensor to ensure proper functionality. Once set up, sensors can be managed using PowerAgent software. Note: some power sensors do not require a separate cadence sensor in order to display cadence data.

1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] in and release to select **Sensors**.

3. Press [JOYSTICK] in and release to select **Cadence Sensor.**

4. Press [JOYSTICK] up/down to highlight **Add New Sensor**. Press [JOYSTICK] in and release to select **Add New Sensor.**

5. Make sure the power sensor is awake and isolated from other active sensors by 65 feet/20 meters. Rotate the crank to wake up the cadence sensor.

6. Press the [JOYSTICK] in and release to **Start Pairing.** Pairing may take up to 60 seconds. Once pairing is successful, the sensor ID will be displayed. The sensor is automatically activated after successfully pairing.

7. Press [JOYSTICK] up/down to highlight **Name**. Press [JOYSTICK] in and release to select **Name** and change the name of the paired power sensor. Press [JOYSTICK] in and release to save changes.

8. Once a sensor has been paired and activated Joule 2.0 will automatically find the active sensor whenever it is turned on.

Setting Up Speed Sensors

Joule 2.0 is compatible with ANT+ speed sensors, each having a unique code. Joule 2.0 needs to be paired to each sensor to ensure proper functionality. Once set up, sensors can be managed using PowerAgent software.

1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] in and release to select **Sensors**.

3. Press [JOYSTICK] up/down to highlight **Speed Sensor**. Press [JOYSTICK] in and release to select **Speed Sensor**.

4. Press [JOYSTICK] up/down to highlight **Add Speed** or **Add Speed Cad**. Press [JOYSTICK] in and release to select **Add Speed** or **Add Speed Cad.**

5. Make sure the Speed Sensor is awake and isolated from other active sensors by 65 feet/20 meters. Note: For most Speed Sensors, rotating the wheel will wake up the sensor.

6. Press the [JOYSTICK] in and release to **Start Pairing.** Pairing may take up to 60 seconds. Once pairing is successful, the sensor ID will be displayed. The sensor will be automatically activated after successfully pairing.

7. Press [JOYSTICK] up/down to highlight **Name**. Press [JOYSTICK] in and release to select **Name** and change the name of the paired speed sensor. Press [JOYSTICK] in and release to save changes.

8. Press [JOYSTICK] up/down to highlight the **Wheel Circumference** and press [JOYSTICK] in and release to select wheel circumference. For a list of common wheel circumferences see FAQ section.

9. Once a sensor has been paired and activated Joule 2.0 will automatically find the active sensor whenever it is turned on.

Setting Up Heart Rate Sensors

Joule 2.0 is compatible with ANT+ heart rate sensors, each having a unique code. Joule 2.0 needs to be paired to each sensor to ensure proper functionality. Once set up, sensors can be managed using PowerAgent software.

1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] in and release to select **Sensors**.

3. Press [JOYSTICK] up/down to highlight **Heart Rate Sensor**. Press [JOYSTICK] in and release to select **Heart Rate Sensor**.

4. Press [JOYSTICK] up/down to highlight **Add New Sensor.** Press [JOYSTICK] in and release to select **Add New Sensor**.

5. Make sure the Heart Rate Sensor is being worn and isolated from other active sensors by 65 feet/20 meters.

6. Press the [JOYSTICK] in and release to **Start Pairing.** Pairing may take up to 60 seconds. Once pairing is successful, the sensor ID will be displayed. The sensor is automatically activated after successfully pairing.

7. Press [JOYSTICK] up/down to highlight **Name.** Press [JOYSTICK] in and release to select **Name** and change the name of the paired heart rate sensor. Press [JOYSTICK] in and release to save changes.

8. Once a sensor has been paired and activated Joule 2.0 will automatically find the active sensor whenever it is turned on.

Setting Up Resistance Unit Sensors

Joule 2.0 is compatible with CycleOps electronic resistance units (RU) found on the CycleOps 400 Pro indoor cycle and PowerBeam Pro trainer. In order to be paired, CycleOps electronic resistance units need to be set for pairing by unplugging them for 5 seconds and the plugging them back in.

1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] in and release to select **Sensors.**

3. Press [JOYSTICK] up/down to highlight **RU Sensor.** Press [JOYSTICK] in and release to select **RU Sensor**.

4. Press [JOYSTICK] up/down to highlight **Add Trainer (for PowerBeam)** or **Add ICRU (for 400 Pro Indoor Cycle)**. Press [JOYSTICK] in and release to select **Add Trainer or ICRU.**

5. Make sure the RU sensor has been unplugged and plugged back in in the last 30 seconds.

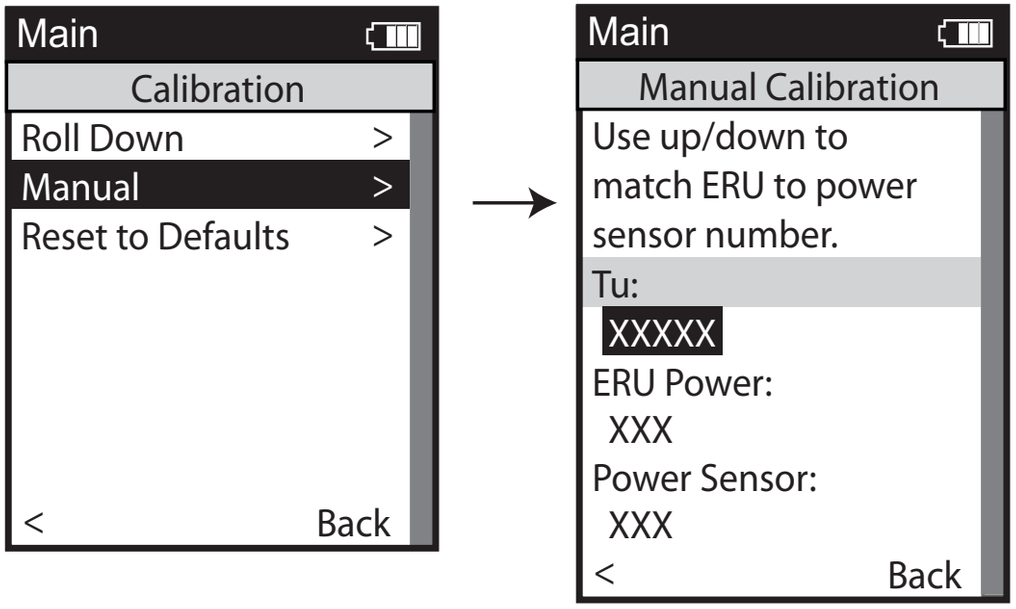
6. Press the [JOYSTICK] in and release to **Start Pairing**. Pairing may take up to 60 seconds. Once pairing is successful, the sensor ID will be displayed.

7. Press [JOYSTICK] up/down to highlight **Name**. Press [JOYSTICK] in and release to select name and change the name of the paired RU sensor. Press [JOYSTICK] in and release to save changes. The sensor is automatically activated after successfully pairing.

8. Once a sensor has been paired and activated Joule 2.0 will automatically find the active sensor whenever it is turned on.

Manual Calibration for CycleOps PowerBeam Pro Trainer

If you use a power meter such as the PowerTap, you can perform a manual calibration to more accurately calibrate your CycleOps PowerBeam Pro trainer. Note: the power meter must be paired to Joule 2.0 prior to performing the manual calibration.



1. Before entering the calibration routine, warm up the PowerBeam Pro and tires by riding the system for five minutes.

2. Press and release the [MODE] button until **Main** mode is displayed.

3. Press [JOYSTICK] in and release to select **Sensors**.

4. Press [JOYSTICK] up/down to highlight **RU Sensor**. Press [JOYSTICK] in and release to select **RU Sensor**.

5. Press [JOYSTICK] up/down to highlight the active **RU Sensor**. Note: the active RU Sensor is indicated by a hash mark next to the name in the RU Sensor list. Press [JOYSTICK] in and release to select the active **RU Sensor**.

6. Press [JOYSTICK] up/down to highlight **Calibration**. Press [JOYSTICK] up/down to select **Calibration.**

7. Press [JOYSTICK] up/down to highlight **Manual Calibration**. Press [JOYSTICK] in and release to select **Manual Calibration**.

8. Joule 2.0 will show the measured power using the current rolling resistance calibration.

9. Pedal at a constant speed to stabilize the resistance. Target 20 mph and press [JOYSTICK] up/down to change the calibration until the displayed power matches the measured power.

10. When the two values match, press [JOYSTICK].

11. The unique rolling resistance calibration is now incorporated into the factory calibration. This calibration will remain in the system until another calibration is performed. Note: The Roll Down Calibration and the Manual Calibration adjust the same calibration values. Only the last calibration values are saved.

Roll Down Calibration for CycleOps PowerBeam Pro Trainer

The CycleOps PowerBeam Pro resistance unit is calibrated at the factory. This enables it to accurately measure power using similar technology as a PowerTap. Rolling resistance is calibrated into each individual resistance unit, but can vary depending on tire type, tire pressure, clamping pressure and other conditions. To obtain the most accurate results, follow these guidelines:

- Perform the Manual Calibration described below.
- Inflate tires to the rated pressure.
- Attach the bicycle according to the PowerBeam Pro trainer user guide
- Clamp the resistance unit to the rear tire according to the PowerBeam Pro trainer user guide
- For mountain bicycles, use smooth tires. Knobby tires are noisy and contribute to inac

  curacies.

1.Before entering the calibration routine, warm up the PowerBeam Pro and tires by riding the system for five minutes.

1. Press and release the [MODE] button until **Main** mode is displayed.

3. Press [JOYSTICK] in and release to select **Sensors**.

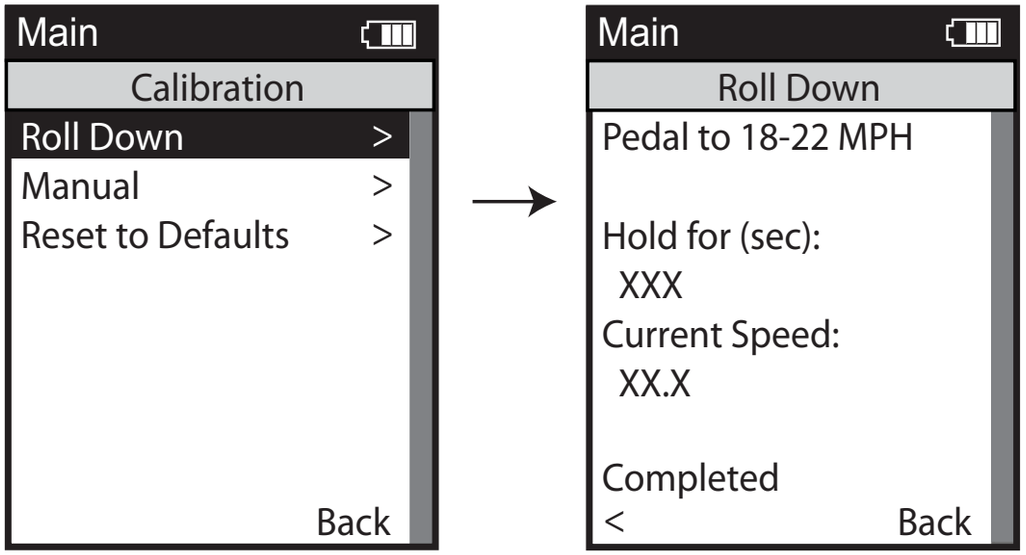
4. Press [JOYSTICK] up/down to highlight **RU Sensor**. Press [JOYSTICK] in and release to select **RU Sensor**.

5. Press [JOYSTICK] up/down to highlight the active **RU Sensor**. Note: the active RU Sensor is indicated by a hash mark next to the name in the RU Sensor list. Press [JOYSTICK] in and release to select the active RU Sensor.

6. Press [JOYSTICK] up/down to highlight **Calibration**. Press [JOYSTICK] up/down to select **Calibration**.

7. Press [JOYSTICK up/down to highlight **Roll Down** calibration. Press [JOYSTICK] in and release to select **Roll Down** calibration.

Roll Down Calibration for CycleOps PowerBeam Pro Trainer...continued



8. Once selected, the roll down calibration process will begin with instructions to pedal at 18 mph.

9. Once at 18 mph, hold this speed for two minutes. A count down timer displays your remaining time.

10. After two minutes, immediately stop pedaling and allow the bicycle wheel to coast to a complete stop.

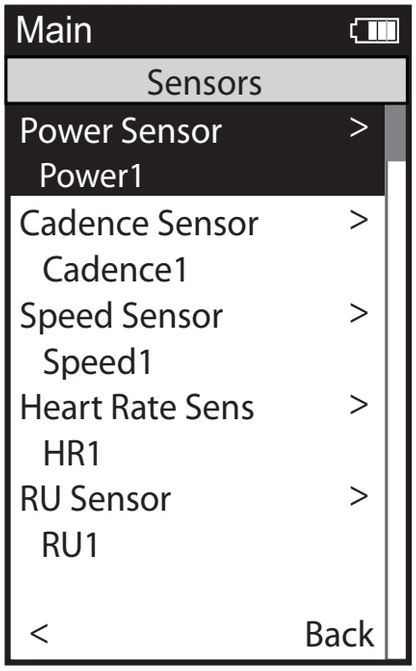
11. Do not touch or disturb the resistance unit while coasting. Do not pedal or apply the brakes while coasting.

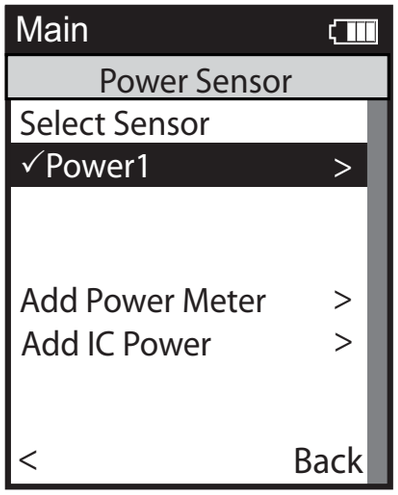
12. After the resistance unit comes to a complete stop, a "Calibration Passed" message will be shown. Note: if you do not wait the full two minutes or another issue occurs during calibration, a "Calibration Failed" message will be shown and calibration must be repeated. Note: If calibration continues to fail, contact Saris Cycling Group at 1-800-783-7257.

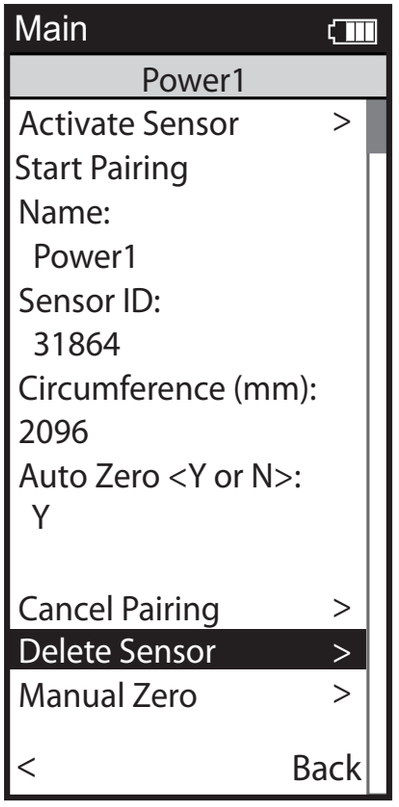
13. The unique rolling resistance calibration is now incorporated into the factory calibration. This calibration will remain in the system until another calibration is performed.

Deleting Sensors

Sensors can be deleted at anytime. If the active sensor is deleted a new sensor must be activated or added.



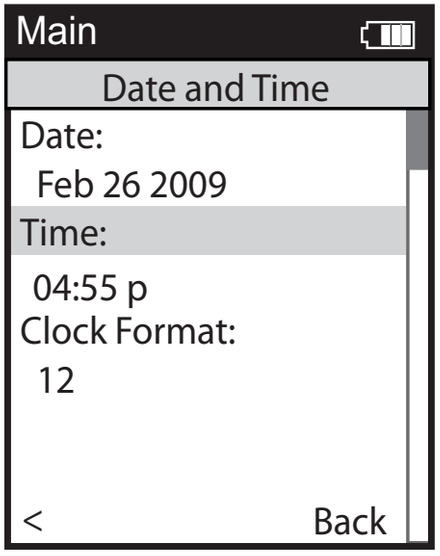




1. Press and release the [MODE] button until **Main** mode is displayed.
2. Press [JOYSTICK] in and release to select **Sensors.**
3. Press [JOYSTICK] up/down to select the sensor type to be deleted.
4. Press [JOYSTICK] up/down to highlight the sensor to be deleted.
5. Press [JOYSTICK] in and release to select the sensor to be deleted.
6. Press [JOYSTICK] up/down to highlight **Delete Sensor**.

Setting Up Date and Time

Joule 2.0 date and time can be set using PowerAgent software > configure device.



1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **Setup Joule**. Press [JOYSTICK] in and release to select **Setup Joule**.

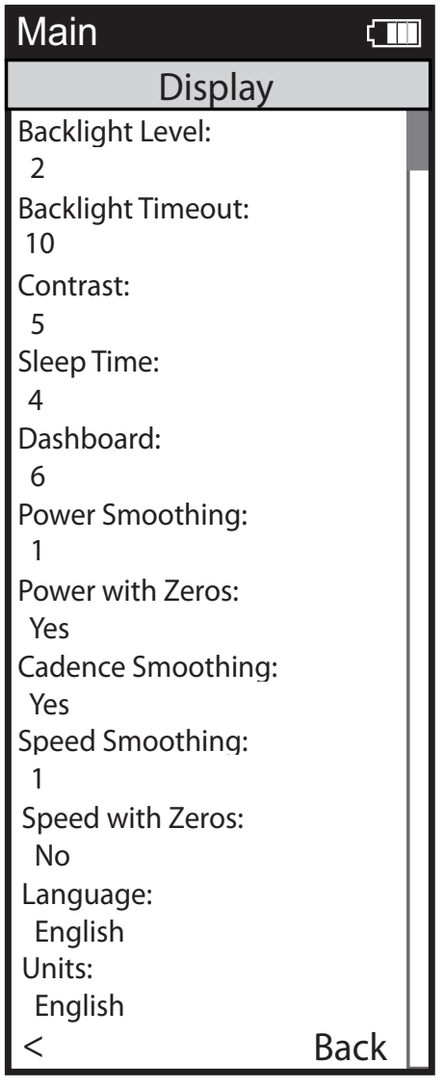
3. Press [JOYSTICK] in and release to select **Date and Time**.

4. Press [JOYSTICK] up/down to highlight **Date** or **Time**. Use [JOYSTICK] to change date and time values. Press [JOYSTICK] in and release to save changes.

5. Press [JOYSTICK] up/down to highlight **Clock Format**. Press [JOYSTICK] in and release to select **Clock Format**. Use [JOYSTICK] to change between 12 and 24 hour format. Press [JOYSTICK] in and release to save changes.

Setting Up Display

Joule 2.0 display can be customized for viewing preferences. PowerAgent software may also be used to change settings.



1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **Setup Joule**. Press [JOYSTICK] in and release to select **Setup Joule**.

3. Press [JOYSTICK] up/down to highlight **Display**. Press [JOYSTICK] in and release to select **Display.**

4. Press [JOYSTICK] up/down to highlight **Backlight Level**. Press [JOYSTICK] in and release to select **Backlight Leve**l.

5. Press [JOYSTICK] up/down to change **Backlight Level** from 1-10. Press [JOYSTICK] in and release to save settings. Note: Backlight Level10 is the brightest level, 1 is the dimmest. Press [JOYSTICK] in and release to save changes.

6. Press [JOYSTICK] up/down to highlight **Backlight Timeout**. Press [JOYSTICK] in and release to select **Backlight Timeout**.

7. Press [JOYSTICK] up/down to change **Backlight Timeout** from Off, 2 seconds, 5 seconds, 30 seconds, 1 minute or On. Note: the backlight will turn on after any button is pressed and remain on for the duration of the **Backlight Timeout** setting. Press [JOYSTICK] in and release to save changes.

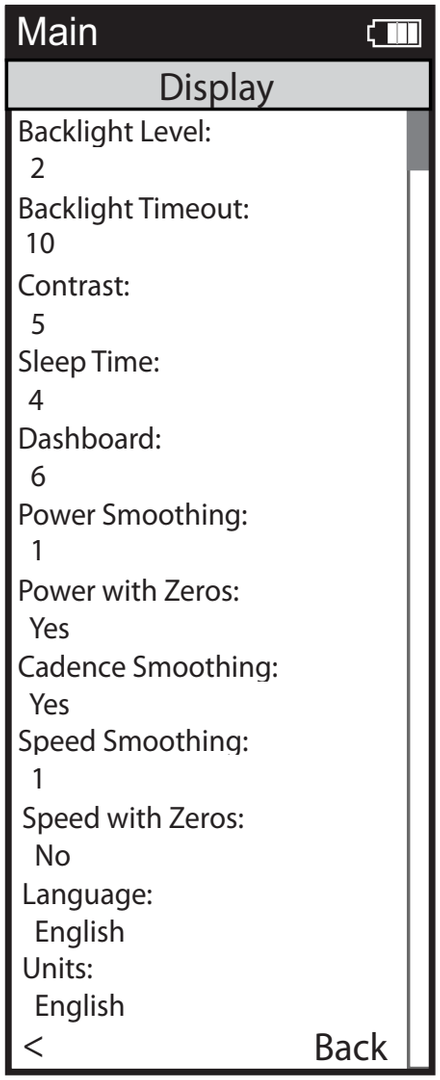
8. Press [JOYSTICK] up/down to highlight **Contrast**. Press [JOYSTICK] in and release to select **Contrast**.

9.Press [JOYSTICK] up/down to change **Contrast** from 1-10. Press [JOYSTICK] in and release to save settings. Note: **Contrast** setting 1 offers little distinction between black and white shades while setting 10 offers greater distinction between black and white shades. Press [JOYSTICK] in and release to save changes.

10. Press [JOYSTICK] up/down to highlight **Sleep Time.** Press [JOYSTICK] in and release to select **Sleep Time.** Press [JOYSTICK] up/down to change **Sleep Time** from 1-5. Press [JOYSTICK] in and release to save changes.

11. Press [JOYSTICK] up/down to highlight **Dashboard.** Press [JOYSTICK] in and release to select **Dashboard.** Press [JOYSTICK] up/down to change **Dashboard** from 3-6. Press [JOYSTICK] in and release to save changes.

Setting Up Display...continued



12. Press JOYSTICK up/down to highlight **Power Smoothing.** Press [JOYSTICK] in and release to select **Power Smoothing**.

13. Press [JOYSTICK] up/down to change Power Smoothing from 1, 2,3,5,10,30. Press [JOYSTICK] in and release to save settings. Note: Power smoothing 1 displays power data as it is sent from the power sensor, Power smoothing 30 displays power data as a 30 second rolling average which can be used for better pacing during intervals and races. Press [JOYSTICK] in and release to save changes.

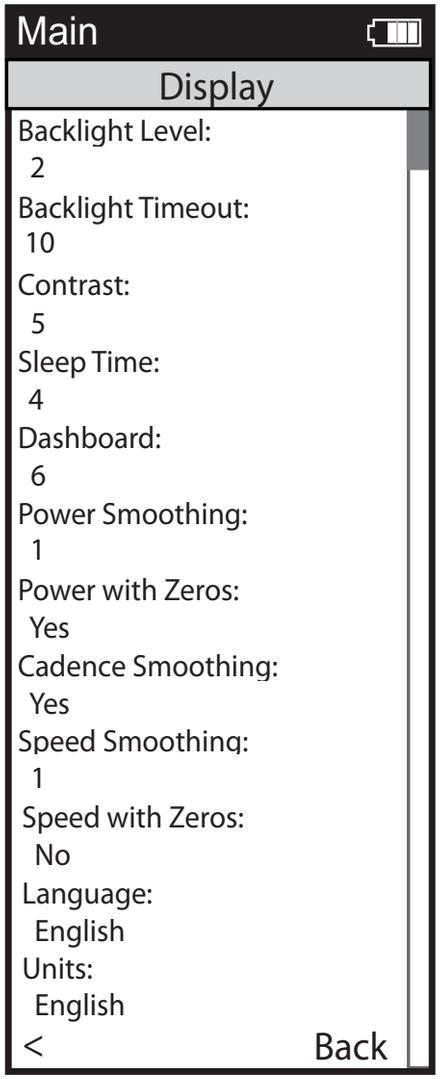
14. Press [JOYSTICK] up/down to highlight **Power With Zeros**. Press [JOYSTICK] in and release to select **Power With Zeros**.
13. Press [JOYSTICK] up/down to change **Power With Zeros** from Yes to No. Press [JOYSTICK] in and release to save settings. Note: Power With Zeros set to Yes will calculate all average power data with zeros included, Power With Zeros set to No will calculate all average power data without zeros or only when pedaling. Press [JOYSTICK] in and release to save changes.

15. Press [JOYSTICK] up/down to change **Cadence Smoothing** from 1, 2,3,5,10,30. Press [JOYSTICK] in and release to save settings. Note: Cadence Smoothing 1 displays cadence data as it is sent from the cadence sensor, Cadence Smoothing 30 displays cadence data as a 30 second rolling average which can be used for better pacing during intervals and races. Press [JOYSTICK] in and release to save changes.

16. Press [JOYSTICK] up/down to highlight **Cadence With Zeros**. Press [JOYSTICK] in and release to select **Cadence With Zeros.**

17. Press [JOYSTICK] up/down to change **Cadence With Zeros** from Yes to No. Press [JOYSTICK] in and release to save settings. Note: CadenceWith Zeros set to Yes will calculate all average cadence data with zeros included, Cadence With Zeros set to No will calculate all average cadence data without zeros or only while pedaling. Press [JOYSTICK] in and release to save changes.

Setting Up Display...continued



18. Press [JOYSTICK] up/down to change **Speed Smoothing** from 1, 2,3,5,10,30. Press [JOYSTICK] in and release to save settings. Note: Speed Smoothing 1 displays speed data as it is sent from the speed sensor, Speed smoothing 30 displays speed data as a 30 second rolling average which can be used for better pacing during intervals and races. Press [JOYSTICK] in and release to save changes.

19. Press [JOYSTICK] up/down to highlight **Speed With Zeros**. Press [JOYSTICK] in and release to select **Speed With Zeros.**

20. Press [JOYSTICK] up/down to change **Speed With Zeros** from Yes to No. Press [JOYSTICK] in and release to save settings. Note: Speed With Zeros set to Yes will calculate all average speed data with zeros included, Speed With Zeros set to No will calculate all average speed data without zeros. Press [JOYSTICK] in and release to save changes.

21. Press [JOYSTICK] up/down to highlight **Language**. Press [JOYSTICK] in and release to select **Language.**

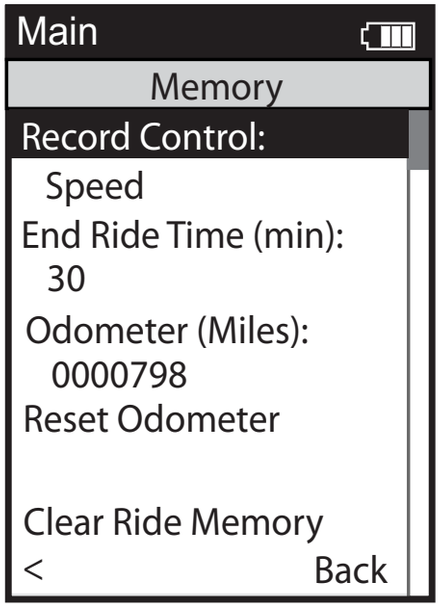
22. Press [JOYSTICK] up/down to change **Language**. Press [JOYSTICK] in and release to save changes.

23. Press [JOYSTICK] up/down to highlight **Units**. Press [JOYSTICK] in and release to select **Units**. Press [JOYSTICK] in and release to save changes.

24. Press [JOYSTICK] up/down to change **Units**. Press [JOYSTICK] in and release to save changes.

Setting Up Memory

Joule 2.0 has 4 MB of onboard memory for storing activities, history and workouts. See Chapter 1: Data Management for details.



1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **Setup Joule**. Press [JOYSTICK] in and release to select **Setup Joule**.

3. Press [JOYSTICK] up/down to highlight **Memory**. Press [JOYSTICK] in and release to select **Memory**.

4. Press [JOYSTICK] up/down to highlight **Record Control**. Press [JOYSTICK] in and release to select **Record Control**.

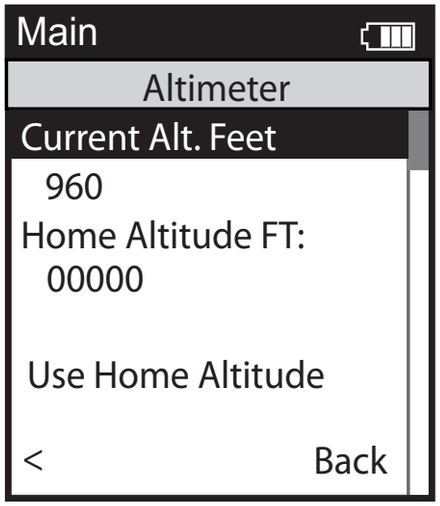
5. Press [JOYSTICK] up/down to switch between **Speed and HRM**. Press [JOYSTICK] in and release to save changes.

6. Press [JOYSTICK] up/down to highlight **End Ride Time.(min)** Press [JOYSTICK] in and release to select **End Ride Time (min)** from 15, 30, 60, 90 or never. Press [JOYSTICK] in and release to save changes. After ride has ended, it has been entered into History data. Note: End ride time controls when the current ride automatically is saved to History and Reports.

7. Press [JOYSTICK] up/down to highlight **Odometer**. Press [JOYSTICK] in and release to select **Odometer**. Press [JOYSTICK] up/down/left/right to adjust **Odometer**. Press [JOYSTICK] in and release to save changes. Press [JOYSTICK] up/down hightlight **Reset Odometer**. Press [JOYSTICK] in and release to reset odometer to defaults.

8. Press [JOYSTICK] up/down to highlight **Clear Ride Memory**. Press [JOYSTICK] in and release to select **Clear Ride Memory**.

Setting Up Altimeter



1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press {JOYSTICK} up/down to highlight **Setup Joule**. Press [JOYSTICK] in and release to select **Setup Joule**.

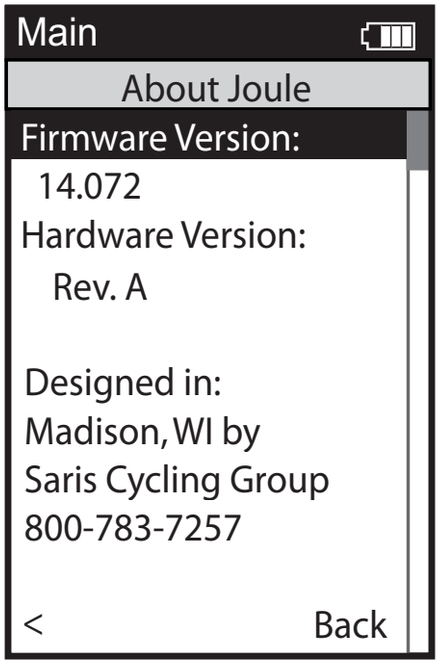
3. Press [JOYSTICK] up/down to highlight **Altimeter**. Press [JOYSTICK] in and release to select **Altimeter**.

4. Press [JOYSTICK] in and release to edit **Home Altimeter**. Press [JOYSTICK] up/down/left/right to edit **Home Altimeter**. Press [JOYSTICK] in and release to save changes.

5. Press [JOYSTICK up/down to highlight **Use Home Altitude**. Press [JOYSTICK] in and release to save changes.

Setting Up About Joule

Firmware version denotes the revision Joule 2.0 is operating on. Reference www.cycleops.com for the latest version.



1. Press and release the [MODE] button until **Main** mode is displayed.

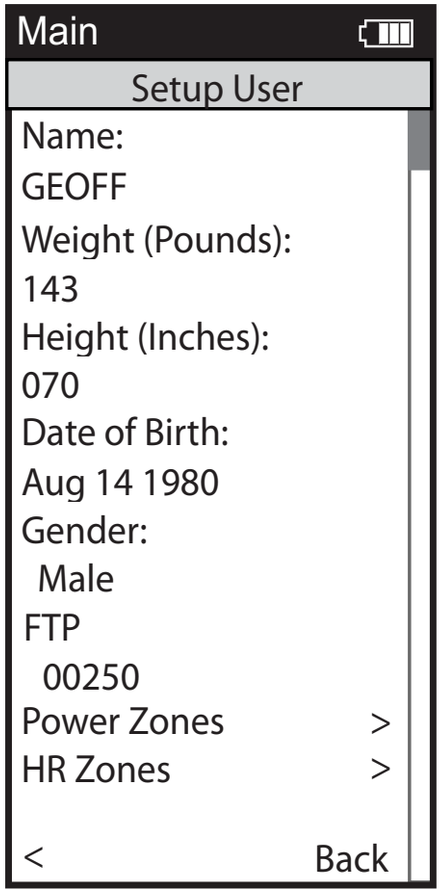
2. Press [JOYSTICK} up/down to highlight **About Joule**. Press [JOYSTICK] in and release to select **About Joule**.

3. Press [JOYSTICK] up/down to highlight **About Joule**. Press [JOYSTICK] in and release to select **About Joule**.

4. Press [JOYSTICK] up/down to view firmware version.

Setting Up User Profile

Setting up a user profile is important for Joule 2.0 to display the most accurate information. A user profile can be set up and managed using PowerAgent software. Note: if using Joule 2.0 in group environment, a USB stick will store user information.



1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **Setup User**. Press [JOYSTICK] in and release to select **Setup User**.

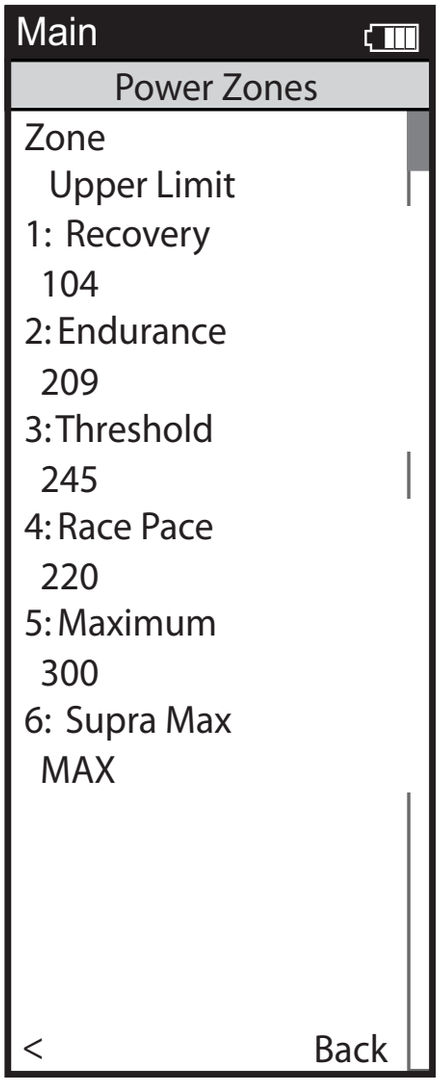
3. Press [JOYSTICK] in and release to select **Name**. Press [JOYSTICK] up/down to spell desired user name. Press [JOYSTICK] in and release to save changes.

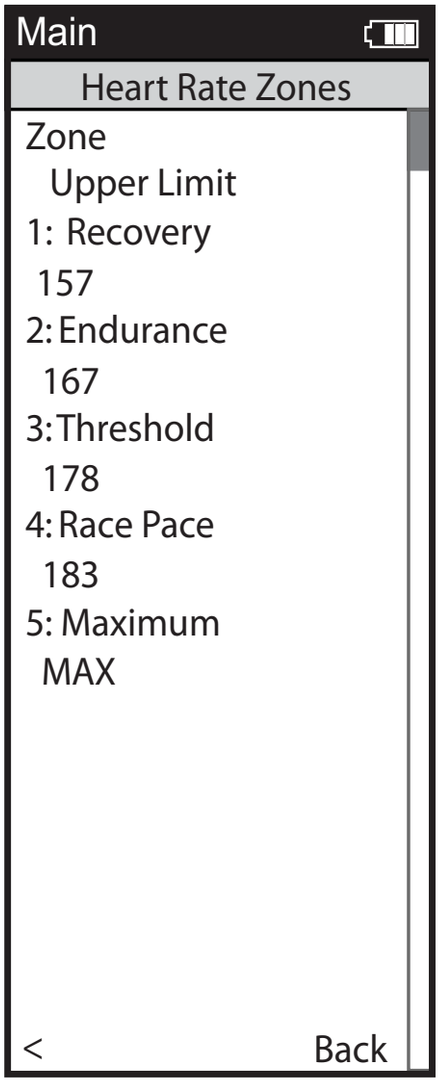
4. Press [JOYSTICK] up/down to highlight **Weight**. Press [JOYSTICK] in and release to select **Weight**. Use [JOYSTICK] to toggle appropriate user weight. Calculations such as: watts/kg and accurate target slope resistance require correct user weight. Press [JOYSTICK] in and release to save changes.

5. Press [JOYSTICK] up/down to highlight **Height**. Press [JOYSTICK] in and release to select **Height**. Use [JOYSTICK] to set appropriate user height. Press [JOYSTICK] in and release to save changes.

6. Press [JOYSTICK] up/down to highlight **Date of Birth**. Press [JOYSTICK] in and release to select **Date of Birth**. Use [JOYSTICK] to set appropriate date of birth. Press [JOYSTICK] in and release to save changes.

Setting Up User Profile...continued





7. Press [JOYSTICK] up/down to highlight **Gender**. Press [JOYSTICK] in and release to select **Gender.** Press [JOYSTICK] up/down to change from male to female. Press [JOYSTICK] in and release to save changes.

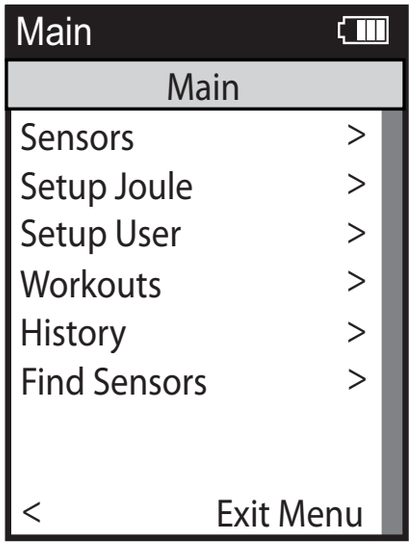
8.Press [JOYSTICK] up/down to highlight **Power Zones.** Press [JOYSTICK] in and release to select **Power Zones**. Press [JOYSTICK] up/down to highlight and select **Recovery Zone, Endurance Zone, Threshold Zone, Race Pace Zone and Maximum Zone**. Press [JOYSTICK] in and release to save changes.

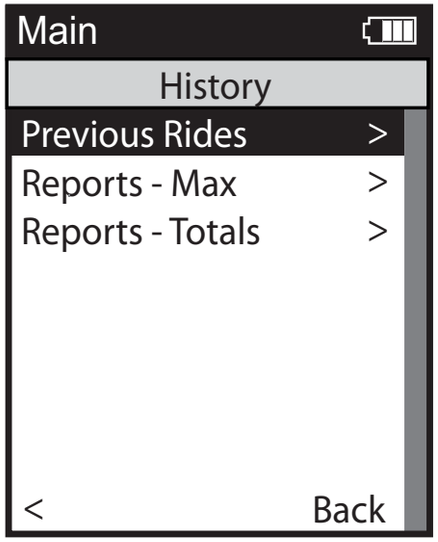
9.Press [JOYSTICK] up/down to highlight **Heart Rate Zones.** Press [JOYSTICK] in and release to select **Heart Rate Zones.** Press [JOYSTICK] up/down to highlight and **Recovery Zone, Endurance Zone, Threshold Zone, Race Pace Zone and Maximum Zone**. Use [JOYSTICK] to set appropriate zone values. Press [JOYSTICK] in and release to save changes.

10.Press [JOYSTICK] up/down to highlight **FTP.** Press [JOYSTICK] in and release to select **FTP.** Press [JOYSTICK] up/down/left/right to edit **FTP**. Press [JOYSTICK] in and release to save changes.

Previous Rides

Previous rides history allows for comparisons of any selected ride to averages over 2 weeks, 4 weeks, 8 weeks, 6 moths or 12 months prior to the selected ride. Note: the averages do not include the selected ride.





1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **History**.

3. Press [JOYSTICK] in and release to select **History**.

4. Press [JOYSTICK] in and release to select **Previous Rides**.

5. Press [JOYSTICK] up/down to highlight desired ride. Note: each ride is named using the format YYYYMMDD HHMMSS so a ride listed as 20091120 154335 was created November 20th, 2009 at 3:43:35 PM.

6. Press [JOYSTICK] in and release to select the desired ride. Note: Reports are now shown with 3 columns; the first column is the metric label, the second column is the data for a given metric on the selected ride and the 3rd column is the average of all rides completed over the selected date range.

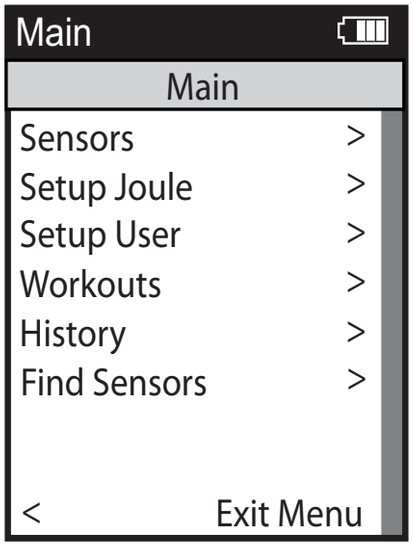
7. Press [JOYSTICK] in and release to change the selected data range from 2 weeks, 4 weeks, 8 weeks, 6 months and 12 months.

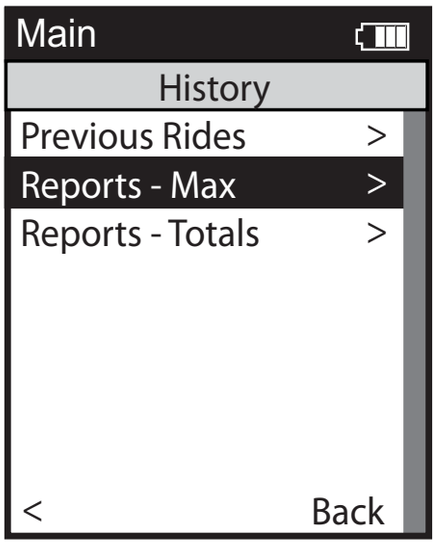
8. Press [JOYSTICK] left/right to change reports and exit History reports.

Note: Rides will be organized and sorted by date, with most current date at top.

Maximum History

Maximum History reports allows for comparisons of the maximum values achieved in a selected time frame to the averages achieved in that same time frame.





1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **History**.

3. Press [JOYSTICK] in and release to select **History**.

4. Press [JOYSTICK] in and release to select **Reports – Max.** Note: Reports are now shown with 3 columns; the first column is the metric label, the second column is the maximum value achieved for a given metric over the selected time frame and the 3rd column is the average of all rides completed over the selected date range.

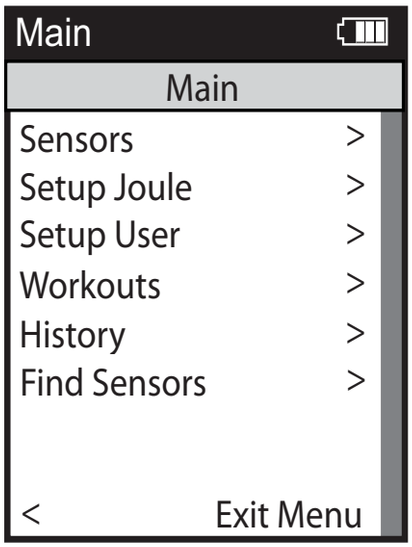
5. Press [JOYSTICK] in and release to change the selected data range from 2 weeks, 4 weeks, 8 weeks, 6 months and 12 months.

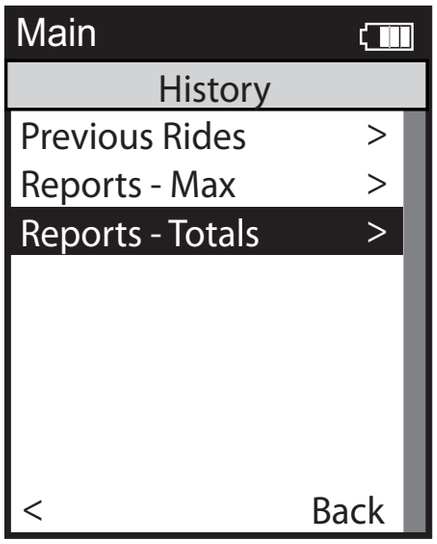
6. Press [JOYSTICK] left/right to change reports and exit History reports.

Note: Max view is the max values achieved for each report metric over the average on two week, four week, etc.

Total History

Totals History reports allows for comparisons of the totals achieved in a selected time frame to the averages achieved in that same time frame.





1. Press and release the [MODE] button until **Main** mode is displayed.

2. Press [JOYSTICK] up/down to highlight **History**.

3. Press [JOYSTICK] in and release to select **History**.

4. Press [JOYSTICK] in and release to select **Reports – Totals.** Note: Reports are now shown with 3 columns; the first column is the metric label, the second column is the total value achieved for a given metric over the selected time frame and the 3rd column is the average of all rides completed over the selected date range.

5. Press [JOYSTICK] in and release to change the selected data range from 2 weeks, 4 weeks, 8 weeks, 6 months and 12 months.

6. Press [JOYSTICK] left/right to change reports and exit History reports.

Note: Total view is the total values achieved for each report metric over the average on two week, four week, etc.

Chapter 10: Troubleshooting CycleOps Joule 2.0

For most up to date Frequently Asked Questions, visit www.cycleops.com.

No display on computer screen
· Computer is asleep – Press [MODE] or [INTERVAL] on the computer to wake up the computer.

· Computer is too cold- operating temp. is 32 to 110 degrees Fahrenheit

Computer display is fully discharged
· It will need to be recharged for at least 30 minutes.

Computer display is on, but there is no transmission of data.
· Hub is asleep - spin the wheel to wake up the hub.
· Computer has not "found" the hub. Press and hold [MODE] and [INTERVAL] until "Find" appears on Title Bar. Make sure hub is awake by rotating wheel once.
· Batteries need replacement - replace the hub batteries as shown in the maintenance section of the User Guide

Power seems incorrect
·Torque value is not zeroed. To manually zero torque, go to Menu, Sensors, Select Sensor, Calibration. Manual Zero the hub. Torque is now being displayed.

If re-zeroing the torque does not recalibrate the unit, call Saris Cycling Group customer service at 1-800-783-7257.

Speed seems incorrect
· Wheel size incorrect -refer to Sensors to enter the correct size in corresponding sensor.

Chapter 11: Important Precautions

WARNING: Always consult a physician before beginning or modifying any exercise program.

Precautions:

- Keep eyes on the road. Do not become overly engaged with CycleOps Joule 2.0 display.
- We recommend getting familiar with the computer functions while stationary.
- The computer and chest strap are water resistant, not water proof. Avoid sustained water contact and do not deliberately place CycleOps Joule 2.0 or its components in water or under high-pressure sprays.
- Avoid spraying the unit directly with solvent mixture. Do not use thinner or other solvents to clean parts.
- Failure to adhere to these precautions may cause premature failure or incorrect operation of the unit and may void the warranty.

Disconnecting:
To avoid losing data, never disconnect the USB port while data is being written. To properly disconnect Joule 2.0 close all appropriate windows. If a drive window is open, close any associated windows before attempting to disconnect your Joule.

- Windows® Operating System

Use the "Safely Remove Hardware" icon in the notification area of the taskbar to safely remove the device before unplugging. The notification area is to the right of the taskbar where you usually see the current time displayed.

1. In the notification area, left-click on the "Safely Remove Hardware" icon .
2. Select the device you want to unplug.
3. When Windows notifies you that it is safe to do so, unplug the Joule from your computer.

- Mac OS® Operating system Software

1. In a Finder window, click the eject icon next to your Joule as shown below.
2. Unplug your Joule.

Chapter 11: Important Precautions

Battery Warnings:

- Charge battery at temperature range of 0-45 degrees Celsius.
- Do not immerse the battery in water or seawater, and keep the battery in a cool dry environment during stands by period.
- Do not connect the battery to an electrical outlet.
- Do not strike or throw the battery against hard surfaces.
- Do not transportor store the battery together with metal objects such as necklaces, hairpins, etc.
- Do not heat or dispose in fire or water. Do not modify or disassembly the battery. It will be dangerous and may cause ignition, heating leakage or explosion.
- Do not short-circuit positive (+) and negative (-) terminals. Keep away from metal or other conductive materials. Jumbling the batteries of direct contact with positive (+) and negative (-) terminals or other conductive materials may cause short-circuit.
- Do not reverse the positive (+) and negative (-) terminals.
- Do not solder the battery directly. Excessive heating may cause deformation of the battery components such as the gasket, which may lead to the battery swelling, leakage, explosion or ignition.
- Do not use abnormal cell which has damages by shipping stress, drop short or something else, and which gives off electrolyte odor.
- Do not use battery in a location where static electricity is rich, otherwise, the safety devices may be damaged, causing a harmful situation.
- If the battery gives off an odor, generates heat or becomes discolored, or in any way appears abnormal during use, recharging or storage, immediately remove it from the device or battery charger and stop using it.
- Do not use sharp things to hit the battery.
- O-rings should be inspected and replaced if necessary whenever the battery cover is removed. Use a light coating of grease when re-installing the battery cover on the O-rings.

Chapter 11: Important Precautions

FCC Statement of Compliance:
Statement of Compliance for FCC and Industry Canada:
"This device complies with Industry Canada and Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."
The term "IC:" before the radio certification number only signifies that Industry Canada technical specifications were met.
Changes or modifications to this device not expressly approved by the party responsible for compliance with FCC regulations (the manufacturer) could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

Chapter 12: Technical Specifications for CycleOps Joule 2.0

FEATURES:	JOULE 2.0
Unit dimensions, WxHxD:	2 inches (49.5mm)wide, 3.5 inches (89.5mm) high, 1 inch (25.5mm) deep
Display size, WxH:	2.2 inches (55.88mm) diagonal
Display resolution, WxH:	128 x 160 pixels
Weight:	2.6 ounces (74 grams)
Battery:	rechargeable li-polymer
Battery life:	20 hours, typical
Handlebar or stem mount	Yes
Wrist mount	No
Indoor Cycle Mount included	No
Interval specific button	Yes
Resistance specific control	No
Barometric Altimeter	Yes
Water resistant:	Yes
Mass storage device	Yes
Onboard Memory	4 MB
Accepts data cards:	microSD™ card (not included)
Intervals	999
1 second ride data	Approx. 20 hours (1 hr. = 150 KB)
Ride History	Approx. 500 rides (1 ride = 1 KB)
Workouts	Approx. 100 workouts (1 workout = ~5 KB)
Metrics available for history	58
Historical averages for 2 wk, 4 wk, 8 wk, 6 mo., 12 mo.	Yes
Surge count	Yes
Watts/kg	Yes
TSS	Yes
Water resistant	Yes
Water proof	No

FEATURES:	JOULE 2.0
IF	Yes
Normalized Power	Yes
Temperature	Yes
Altitude (barometric pressure)	Yes
Altitude gained	Yes
Altitude lost	Yes
% grade	Yes
VAM	Yes
KJ and KJ per hour	Yes
Peak Power	Yes
Power Zones	Yes
Heart Rate Zones	Yes
ANT+ Power Sensor compatible	Yes
ANT+ Heart Rate Sensor compatible	Yes
ANT+ Speed Sensor compatible	Yes
ANT+ Cadence Sensor compatible	Yes
ANT+ Speed/Cadence Sensor compatible	No
Automatic sync (automatically transfers data to your computer)	No
Virtual pacer	No
Auto Pause (pauses and resumes timer based on speed or HR)	Yes
Auto Lap (automatically starts a new lap)	Yes
Auto Scroll (cycles through data pages during workout)	No
Advanced workouts (create custom, goal-oriented workouts)	Yes
Audible alarms	No
Customizable screen(s)	Yes (Dashboard Mode)

Chapter 13: CycleOps Joule™ 2.0 Warranty

CycleOps Joule 2.0 is warranted to the original retail purchaser to be free from defects in materials and workmanship. Warranty coverage is valid to the original purchaser only and proof of purchase will be required.

Electronics - 1 year

This warranty does not cover:
1. Normal wear and tear.
2. Any damage, failure or loss caused by accident, misuse, neglect, abuse, improper assembly, improper maintenance, or failure to follow instructions or warnings in User Guide .
3. Use of products in a manner or environment for which they were not designed.

Limitations

The foregoing warranties are in lieu of and exclude all other warranties not expressly set forth herein, whether expressed or implied by operation of law or otherwise, including, but not limited to, warranties of merchantability or fitness for a particular purpose. Saris Cycling Group shall in no event be liable for incidental or consequential losses, damages or expenses in connection with its exercise products. Saris Cycling Group's liability hereunder is expressly limited to the replacement of goods not complying with this warranty or, at Saris Cycling Group election, to the repayment of an amount of the purchase price of the exercise product in question. Some states do not permit the exclusion or limitation of implied warranties or incidental or consequential damages, so the preceding limitations and exclusions may not apply to.

Procedures

Warranty service will be performed by Saris Cycling Group or an authorized Saris Cycling Group Dealer. The original purchaser must provide proof of purchase. Service calls and/or transaction to and from the Authorized Saris Cycling Group Dealer are the responsibility of the purchaser.

Chapter 14: Definition of Common Training Terms

Absolute Intensity
1. The actual intensity value. For example, 300 watts, 175 beats per minute, or a 7 on a 1 to 10 RPE chart.

Angular Velocity
1. The rate at which a spinning object rotates. 2. How fast something is spinning in units of angle per unit time such as degrees per second. 3. Angular displacement divided by elapsed time during which the displacement occurs. 4. Cadence or the number of revolutions a rotating object such as a pedal makes in a given time frame. 5. At the pedals or rear hub, power is equal to torque multiplied by angular velocity, thus angular velocity is equal to power divided by torque.

Calorie
1. A unit of energy equal to that needed to raise the temperature of 1 gram or ml of water 1 ˚C. 2. A measure of thermal energy or the energy released when a fuel or substrate is burned.

Category 1 to 4 Climb
1. A rating system used to rank the difficulty of a climb that is based on a combination of the length, grade, and location of the climb on the course. A category 1 climb is considered the most difficult while a category 4 climb is considered the least difficult.

Elevation
1. The total vertical distance in feet or meters above sea level where 1 meter is equal to 3.224 feet.

Endurance Zone
1. A moderate exercise intensity where there is some stress or strain on the body 2. On a 1 to 10 RPE scale, an intensity corresponding to 3 to 4 or "moderate" to "sort of hard". 3. On a 6 to 20 RPE scale, an intensity corresponding to a 10 to 13 or "fairly light" to "somewhat hard." 4. An exercise intensity depending on the aerobic metabolism of both fat and carbohydrate. 5. An exercise intensity that can be held as long as the athlete were supplied with an influx of carbohydrate (i.e., allowed to eat).

Force
1. A vector quantity that produces an acceleration of a body in the direction of its application. 2. To push. 3. The amount of pressure applied to the pedals or rear hub. 4. A measure of strength. 5. Power divided by velocity.

Gross Mechanical Efficiency (GME)
1. The percentage of stored energy or food burned by the body that is converted to actual power output. For an average person riding a bicycle the gross mechanical efficiency is equal to 22%. Thus, for every 100 Kcals burned by an average person, only 22 Kcals is converted to actual power at the pedals or rear hub. The rest is simply dissipated as heat or is used for other non-pedaling functions. 2. In the past GME has been shown to be an important predictor of cycling performance. Recent evidence, however, is controversial. Still, there are reports that the highest GME's found are in riders competing in grand tours like the Tour de France.

Hors Category Climb
1. A climb that is so difficult that it is beyond categorization. 2. Any climb longer and steeper than a category 1 climb. 3. The most difficult climb in the Tour de France.

Horsepower
1. A measure of power where 1 horsepower is equal to 746 watts.

Intensity
1. The actual or perceived difficulty of a given workout, ride, or exercise bout. 2. The power output or rate of energy expenditure. 3. How hard a workout, ride or exercise bout is. 4. The heat or temperature. 5. The degree of difficulty. 6. Stress, when measured directly as the actual power output. 7. Strain, when measured as the response to a given power output (e.g., heart rate, perceived exertion, oxygen consumption) 8. The percent of some reference maximal or sub-maximal value.

Kilocalorie or Kcal

1. 1000 calories. 2. A unit of energy equal to that needed to raise the temperature of 1 kilogram or liter of water 1 ˚C. 3. A measure of the amount of energy in food 4. On U.S. food labels, 1 Calorie, spelled with a capital "C", rather than a lower case "c" is equal to 1 Kilocalorie or Kcal. 5. 4.186 Kjoules 6. For a given person, the total energy burned in Kcals is equal to the total Kjoules of work performed on a bicycle divided by 4.186 divided by the percent fraction (i.e., 22% = 0.22) of that person's gross mechanical efficiency. 7. 1 to 1.2 multiplied by the total Kjoules.

Lactate Threshold (LT) Zone

1. A hard intensity zone marked by a sudden increase in breathing rate. 2. On a 1 to 10 RPE scale, an intensity corresponding to a 5 to 7 or "hard" to "really hard." 3. On a 6 to 20 RPE scale, an intensity corresponding to a 13 to 16 or "somewhat hard" to "very hard". 4. A range of exercise intensity beginning at a slight inflection or rise in the blood lactate over a resting baseline to an intensity corresponding with a blood lactate 2 to 3 mM above a resting baseline. 5. A demarcation between aerobic metabolism to a mix of anaerobic and aerobic metabolism. 6. An all out exercise intensity that can be held between 40 minutes to 2 hours depending on the availability of stored carbohydrate or glycogen within the body.

Lactate Threshold

1. An exercise intensity where the production of lactate or appearance of lactate in the blood exceeds the removal or disappearance of lactate from the blood. 2. An exercise intensity characterized by a sudden increase in breathing rate or ventilation. 3. An exercise intensity where individuals begin to feel a burning sensation in working muscle. 4. An exercise intensity considered to be hard. 5. An exercise intensity that can be held for a prolonged period of time ranging from 40 minutes to 2 hours. 6. Amongst athletes with similar VO2 max values the power at lactate threshold is the strongest predictor of performance.

Lactate Threshold Break Point

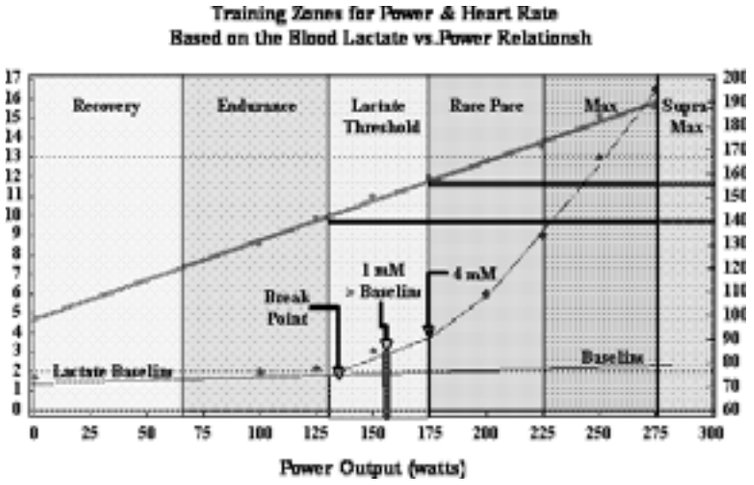
1. The power output or exercise intensity where blood lactate just begins to increase above its resting baseline. 2. An exercise intensity characterized as somewhat hard. 3. The upper end of the endurance training zone and the bottom end of the lactate threshold zone. 4. An exercise intensity that can be held for 1 to 3 hours or as long as there is available stored carbohydrate or glycogen.

Lactate Threshold > 1mM

1. The power output or exercise intensity where the blood lactate is equal to 1 mM above its resting baseline. 2. An exercise intensity characterized as hard. 3. The mid point of the lactate threshold training zone. 4. An exercise intensity that can be held for 1 to 2 hours.

Lactate Threshold 4 mM

1. The power output or exercise intensity at a blood lactate level of 4 mM or 2 to 3 mM above baseline. 2. An exercise intensity characterized as very hard. 3. The upper limit of the lactate threshold zone. 4. An exercise intensity that can be held for 30 minutes to 1 hour.



Normalized Intensity

1. The intensity normalized to some other factor such as body weight or aerodynamic drag. For example, for a 70 kg person, 300 watts would be represented as 4.3 Watts per Kg.

Max Zone

1. An all out or maximal intensity zone. 2. On a 1 to 10 RPE scale, an intensity corresponding to a 9 to 10 or "really really hard" to "maximal." 3. On a 6 to 20 RPE scale, an intensity corresponding to an 18 to 20, or "very very hard" to "maximal." 4. An exercise intensity that elicits the causes the body to reach its maximal capacity to consume oxygen (i.e., an exercise intensity that elicits VO2 max). 5. An all out or maximal effort that can be held between 2 to 8 minutes or an average of 4 minutes.

Periodization

1. Breaking a training or race program into distinct periods where different attributes important to a cyclist's overall performance are developed. 2. The idea that training adaptations are optimized by periods of hard work that exceed the average training load accustomed to by the athlete which are then followed by periods of easy work or recovery that are below the average training load normally performed by the athlete.

Peak Sustainable Power or Peak Power

1. The highest average power output that can be held for a given duration. 2. For most individuals a peak sustainable power or peak power output lasting 4 to 8 minutes is equivalent to an intensity that elicits their VO2 max, or maximal capacity to consume oxygen. 3. For most individuals a peak sustainable power output lasting 20 to 40 minutes is equivalent to an intensity that elicits their lactate threshold or a value of blood lactate 2 to3 mM above their baseline blood lactate. 4. For most individuals a peak sustainable power output lasting 40 minutes to 2 hours is equivalent to an intensity that elicits their lactate threshold, or a value of blood lactate just above to 1 mM above their baseline blood lactate. 5. In cycling, the peak sustainable power for any given duration is analogous to their best performance for a given time. For example, a runner might have a personal best of 5 minutes in a mile run and 35 minutes in a 10 km run, whereas a cyclist might have a personal best or peak sustainable power of 400 watts for 5 minutes and 340 watts for 35 minutes.

Race Pace Zone

1. An extremely hard or all out intensity zone. 2. On a 1 to 10 RPE scale, an intensity corresponding to a 7 to 8 or "really hard" to "really really hard." 3. On a 6 to 20 RPE sale, an intensity corresponding to a 16 to 18 or "very hard" to "very very hard." 4. An exercise intensity dependent primarily on the aerobic and anaerobic metabolism of carbohydrate. 5. An all out exercise intensity that can be held between 10 minutes to 30 minutes.

Rating of Perceived Exertion (PE or RPE)

1. An individual's rating of effort or intensity typically scored on a 1 to 10 scale where 1 is equal to rest and 10 is equal to a maximal or all out effort. 2. An individual's rating of effort or intensity scored on a 6 to 20 scale, where 6 is equal to rest and meant to be equivalent of a resting heart rate of 60 beats per minute and 20 is equal to a maximal effort or a heart rate of 200 beats per minute.

1-10 RPE Scale	
0	Rest
1	Really Easy
2	Easy
3	Moderate
4	Sort of Hard
5	Hard
6	
7	Really Hard
8	
9	Really, Really, Hard
10	Maximal: Just like my hardest race

6-20 RPE Scale	
6	Very very light
7	
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Very very hard
20	

Recovery Zone

1. An easy exercise intensity where there is minimal stress or strain on the body. 2. On a 1 to 10 rating of perceived exertion scale, the recovery zone corresponds to a 1 to 2 or "really easy" to "easy". 3. On a 6 to 20 rating of perceived exertion scale, the recovery zone corresponds to a 6 to 10 or "very very light" to "very light." 4. An exercise intensity dependent solely on aerobic metabolism of primarily fat. 5. An exercise intensity that can be held for an indefinite time frame.

Relative Intensity

1. The intensity represented as a percentage of some maximal or sub-maximal reference value. For example, 300 watts would be 80% of VO2 max power or 100% of LT power.

Strain or Response
1. An indirect measure of the exercise intensity such as the cardiovascular (i.e., heart rate), metabolic, or psychological response to a given power output. 2. A measure of the total training load or work done that is based on a person's response to a workout or bout of exercise rather than on the actual work. 3. An index of the effect a given pattern or distribution of power output or stress has on a given individual that is analogous to a wind chill factor or heat index. 4. A composite representation of the difficulty of a ride or workout that is based on indirect measures of exercise intensity rather than direct measures of exercise intensity. 5. A composite representation of the exercise intensity based on a manipulation of the actual or direct measure of power.

Stress or Stimulus
1. A direct measure of the exercise intensity such as the power output.
2. The total amount of work done in Kjoules calculated from direct measures of power output.

Stress to Strain Index
1. The ratio between the actual work done calculated from direct measures of power and the work done calculated from perceived exertion. Theoretically, if an index of 1.0 indicates that a rider's perception of effort matches what actually happens. An index below 1.0 indicates that the rider feels the effort was easier than what actually happened. Finally, an index above 1.0 indicates that the rider feels the effort was harder than what actually happened. The index allows us to relate the actual stress to an athlete's strain. That is, it allows us to better understand how a given amount of work affects the rider. If the index is below 1.0, there is a minimal effect while above 1.0 there is a strong effect.

Supra-Max Zone
1. A very short, all out effort that exceeds the power output associated with VO2 max or a person's max zone. 2. An exercise intensity that is almost entirely dependent on the anaerobic metabolism of stored ATP, Phosphagens, and carbohydrates. 3. An all out effort lasting 1 second to 2 minutes.

Torque
1. A force applied through a turning axis at a point some distance away from that axis. 2. A turning or twisting force. 3. Force x Distance. 4. Power divided by angular velocity.

VO2 Max

1. The maximal amount of oxygen that a person can consume and process measured in liters of oxygen per minute (absolute) or in milliliters of oxygen per minute per kilogram of body weight (normalized to body weight). 2. The upper limit of aerobic metabolism. 3. A strong predictor of endurance performance in a mixed population of individuals. 4. An exercise intensity corresponding with the maximal power output a person can hold between 2 to 8 minutes.

Work from RPE

1. The total amount of work in Kjoules calculated by estimating the average power output from a rider's perceived exertion rather than the actual power. 2. An estimate of the total work or energy released that is based on the rider's rating of perceived exertion.

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