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A0250: KATECH WHISTLER INSTRUCTIONS

Note: Whistler requires 110-volt power supply and a compressed air supply. A portable air tank will run a whistler for 15 to 20 minutes. In addition, compressed air is needed to operate an air nozzle to purge gasoline vapors from the combustion chamber.

Instruction Video: Please see Katech Performance on YouTube if QR code does not work.

Our Whistler has recently been updated, featuring a 5" digital screen with six side buttons and one adjustment knob, improving user experience and allowing for faster and easier adjustment and use of the tool.

***CAUTION:* READ THIS INSTRUCTION MANUAL IN ITS ENTIRETY BEFORE USE OF THE UNIT. INCORRECT OPERATION MAY CAUSE DAMAGE OR UNIT INACCURACIES. KATECH ENGINES IS NOT LIABLE FOR ANY DAMAGE CAUSED BY INCORRECT USER OPERATION, OR REGULATORY INFRACTIONS ISSUED AS A RESULT OF INCORRECT WHISTLER USAGE.**

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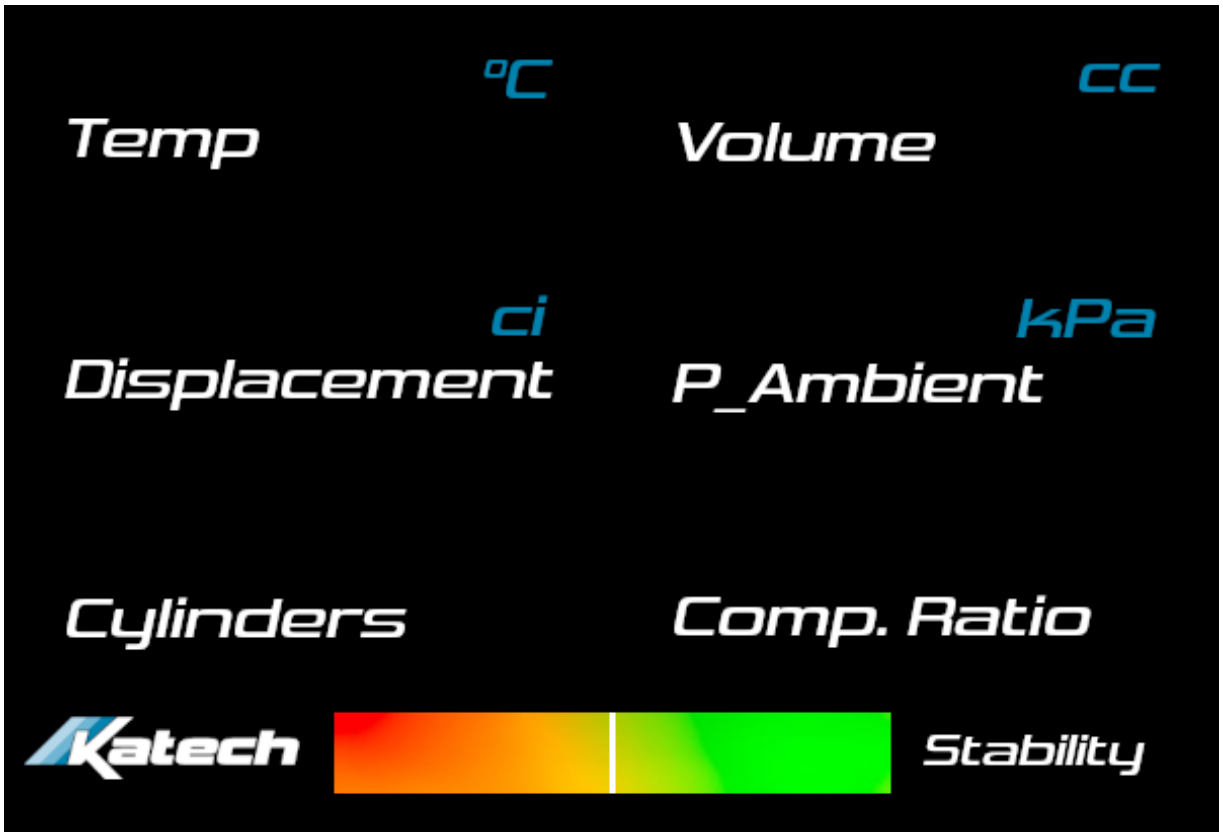
SECTION 1: DISPLAY DESCRIPTION



Temperature setting: Adjusted by the user to match the engine temperature, with an acceptable tolerance of ±5°F.

Displacement setting: Adjusted by the user to the total engine displacement (e.g. 350 ci or 5740cc). This value is automatically converted when units are changed. Please note that this value must be accurate for compression ratio to be correct.

Cylinders: Adjusted by the user, this is the total number of cylinders of the engine being measured. This will scale the compression ratio value and must be set correctly.

Volume: Output from the unit, this value is updated while whistling, and represents the CC or CI the whistler is detecting. Please see note on measurement explanation for details.

P_Ambient: Output from the unit, this value is read from an internal barometric pressure sensor, and is used in the internal calculation for measured chamber volume. It is also displayed for the user in cases of sensor failure causing incorrect readings, or for other purposes.

Comp. Ratio: Output from the unit, displaying the measured compression ratio given the input parameters. Resolution of 0.01 CR. Please see note on measurement explanation for details.

Stability: Output from the unit showing how stable the measured signal is, please see note on measurement explanation for details.

SECTION 2: BUTTON / ICON DESCRIPTION

Icon description:

Temperature Adjustment to match engine, displayed in °C or °F.	Menu icon, to save presets, change units, view instantaneous values, and version information.
Engine displacement adjustment, displayed in cubic centimeter (CC) or cubic inch (CI)	Brightness adjustment, opens dialog with current brightness percentage.
Number of engine cylinders, for correct compression ratio calculation.	Reset measurement icon, resets rolling measurement.

Inside the menu:

UNITS	Change units from US (Imperial) to SI (Metric)	Menu return, returns user back to main screen	
CAL	For Katech use only	Brightness adjustment, opens dialog with current brightness percentage.	
SAVE	Save current preset	Reset measurement icon, resets rolling measurement.	

To adjust items, select them with the side buttons on the unit, then turn the knob to the right until the desired value is achieved.

Note on save feature: The revised whistler features a save option, which allows user information to be stored and loaded on startup. The values saved are:

- Temperature
- Displacement
- Number of Cylinders
- Brightness
- Units

For example, if V8 6.2L (378CI) engines are measured in a controlled environment like a machine shop frequently, where the ambient temperature is set to 70°F often, these settings can be saved so that they do not need to be dialed in every time the unit is powered on. To use this feature, simply select all values desired to be saved, navigate to the menu and press the save button. A dialog with “Preset saved” will appear, and the values entered will be automatically loaded when the unit is next powered on.

SECTION 3: MEASUREMENT INSTRUCTIONS

Prepare engine for measuring by removing any convenient spark plug. With ignition off or injectors disconnected, crank engine with starter for a few seconds. Engine should then be rotated to get piston near top dead center with both valves closed. Cylinder 1 should be near TDC with timing mark at 0. Purge any remaining gasoline vapors from combustion chamber using a nozzle and compressed air. Screw whistle adapter into spark plug hole. At this time, check engine combustion chamber for temperature. A reading of ±5°F is close enough. If a thermometer or other temperature-measuring device is not available, the engine water temperature may be used. Katech recommends using a calibrated laser thermometer, or a high quality RTD thermocouple with minimum 1% accuracy.

Plug Whistler into 110-volt supply (9VDC power supply for SNs over 3005, 5VDC otherwise). Allow unit to run until main screen is seen. Start times over 10 seconds are normal.

CAUTION: BEFORE CONNECTING AIR SUPPLY, ENSURE THAT THE REGULATOR IS ADJUSTED TO THE OFF POSITION (LARGE KNOB TURNED ALL THE WAY COUNTER-CLOCKWISE)

Plug in air supply and adjust regulators until flow meter on front of instrument reads 30 SCFH. (Flow meter must be vertical to set airflow). The large knob in the center of the unit is the air pressure regulator, think of it as a coarse adjustment. The small knob is a fine adjustment. Start by turning the small knob Clockwise (CW) until there is no air flow, then CCW ¼ of a turn out. Then adjust the air regulator for close to 30 SCFH. Then use the small knob to set it as close as possible to 30 SCFH. The accuracy of the unit is dependent on the accuracy of the flow into the cylinder, so careful attention must be placed into correctly setting the airflow. For reference, 1 SCFH difference results in about a 1% deviation in measured volume.

When setting up the Whistler for readings, the internal calibration bottle is used to verify that the unit is functioning correctly. With our updated Whistler, this is now done on a CC / CI basis, different from the CR measurement used before. All bottles are alcohol poured and measured to ± 0.05 cc. This measurement is placed on the front of the unit, and before use, should be verified to be correct.

Insert whistle probe into adapter in spark plug hole, with air flowing. Whistle probe should make an audible noise and the unit will display compression ratio. Rotate engine slowly in either direction to determine if it is at TDC. Display will read highest compression ratio when piston is at TDC. See note on measurement explanation for what the displayed values actually represent. For easy TDC finding, navigate to the menu and see observe the CR_INSTANT value, which shows the instantaneous value being read by the unit.

NOTE: The whistles are calibrated to the unit, and therefore must not be switched between Whistler units if multiple are present on-site.

If anything is not answered in the information above, please reach out to sales@katechengines.com

SECTION 4: BASIC RULES FOR ACCURATE READING AND TROUBLESHOOTING

BASIC RULES FOR ACCURATE READING

1. You must know the size of engine being checked to determine CR accurately. The engine size entered into the computer's memory is the number that the compression ratio is calculated on.

2. The temperature setting must be correctly set. Temperature will affect the compression ratio reading.

3. Purge the chamber being checked with compressed air before measuring. Any gasoline or vapors in chamber could drastically affect the "CR" reading.

4. Whistle probe must be inserted fully into spark plug adapter, and holes on the rear of whistle probe must be unobstructed.

IN CASE OF DIFFICULTY

No tone from whistle, unsteady reading Whistler

One or more valves open – engine not at TDC on compression stroke

Bent valve or other leak in chamber

Piston too far away from TDC

If you cannot get a steady tone from whistle, try another cylinder

Check tubing between whistle tube and whistler for bends or obstructions

Do not obstruct air exiting back of whistle tube with hand

******IMPORTANT******

ANY MODIFICATION OF THE WHISTLE OR SPARK PLUG ADAPTER WILL RESULT WITH AN IMPROPER READING ON THE DISPLAY.

SECTION 5: MEASUREMENT EXPLAINATION

When using the Whistler, once set up correctly, measurements are taken of the tone being produced by the whistle in the combustion chamber. These measurements are referenced to a calibration specific to each unit, and for each measurement, a chamber volume in cubic centimeters (CC) is produced.

The updated Whistler functions differently than previous versions, where only instantaneous values were displayed. The updated unit instead uses rolling averages that improve with time and increased number of measurements. What this means is that as more measurements are taken (more time at a constant engine position), the displayed values will improve to a steady value. Additionally, the standard deviation of all stored measurements is calculated, and reflected in the stability bar at the bottom of the display. When this stability is low, meaning there is excessive noise in the signal, the bar will read to the left (red). When the stability is high, the bar will read to the right (green). Measurements should be taken until the stability bar is completely to the right. This represents that one standard deviation σ is less than 0.2 CCs.

The rolling average and standard deviation (Stability) are reset with the *Reset Measurement* button on the bottom right of the display. This should be used once the engine is verified to be at Top Dead Center (TDC). This will then begin a new measurement and reset all internal values.

Note on accuracy

An accuracy of ±0.1 CR can be assumed in most conditions. However, thanks to new strategy of rolling averages and improved calibration, the Whistler can achieve compression ratio accuracy of ±0.05 CR (0.1 CC nominal) values under ***IDEAL*** conditions. The criterion for higher accuracy are as follows:

- The engine and Whistler unit are at ambient temperature (vehicle / engine / box have not been sitting in the sun.
- Calibration bottle is verified to ±0.05 CC by fine tuning the temperature in °F (higher resolution than °C)
- Engine is free from excessive carbon buildup
- Flow rate is within ±0.5 SCFH from the 30 SCFH target
- Unit has been calibrated according to Katech's specifications on allowable calibration time.
- Correct whistler spark plug adapter is selected and fully seated / torqued to manufacturers specifications into the spark plug hole.
- Whistle hoses are leak free and fully seated into both the Whistle itself and the unit.
- The precise displacement of the engine is known (350ci Chevrolet Engines are almost never precisely 350ci). Use the actual bore and stroke of the engine and use online calculators.
- A steady, quality air source is used. This means large tank volumes (>10 gallon), and moisture control. Excessive moisture in the lines will disturb readings and result in inaccurate measurements. Be aware of air compressor turn-on causing momentary spikes or drops in air pressure, and therefore air flow rate.