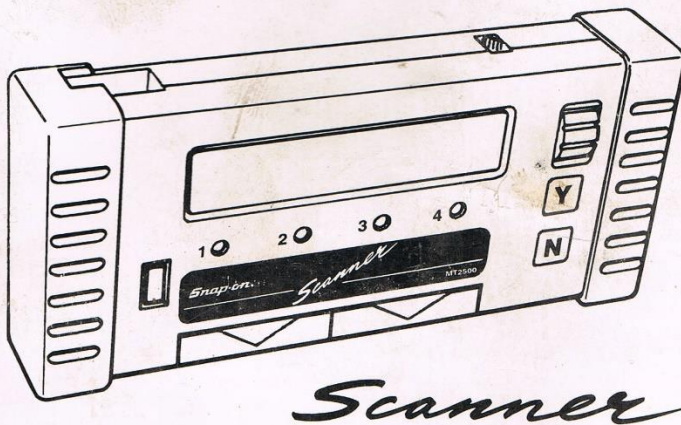


BMW Reference Manual

First Edition



Scanner

Snap-on®

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**First Edition
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Safety Warnings and Cautions

1. Do all testing in a well-ventilated area. Route vehicle exhaust outside if the test area does not have adequate ventilation.
2. Do not smoke or allow sparks or open flame near fuel system parts.
3. Do not smoke or allow open flame near a battery.
4. Unless specifically directed otherwise by a manufacturer's procedure, be sure the ignition switch is off before connecting or disconnecting the Scanner connectors or any vehicle electrical terminals.
5. When connecting the Scanner, plug the power cable into the cigarette lighter or connect the battery power cable. Then plug the test adapter into the vehicle connector.
6. Be sure that the Scanner power cable is disconnected before removing or installing a cartridge.
7. When using the Scanner in an engine compartment, keep all cables, test leads, and tools away from drive belts and other moving parts. Do not allow cables and test leads to touch exhaust manifolds or other hot parts.
8. Do not wear watches, rings, or loose-fitting clothing when working in an engine compartment.
9. Battery electrolyte is corrosive. Do not allow electrolyte to contact your skin. Wash your hands immediately if you touch corroded battery terminals.
10. Do not create an electrical connection between battery terminals with a jumper wire or tools. Never ground a hot (+) electrical terminal.
11. Before performing any test with the engine running, place the gear selector in neutral (manual transmission) or park (automatic transmission), set the parking brake, and block the drive wheels. Disconnect the parking brake release mechanism if the vehicle has an automatic parking brake release.

ADAPT POS1(°)_XXXX (range: not available)
ADAPT POS2(°)_XXXX

Used on vehicles with a drive-by-wire electronic throttle system. These parameters indicate how much the ECU is modifying accelerator pedal position sensor inputs based on throttle actuator position and internal programming.

ADAPT VLV 1(°)_XXXX (range: not available)
ADAPT VLV 2(°)_XXXX

Used on vehicles with a drive-by-wire electronic throttle system. These parameters indicate how much the ECU has adapted the throttle valve position to compensate for wear or faulty components.

AIRFLOW (kg/h)_XX (range: 0 to 99 kg/h)
Mass Air Flow Sensor

Used on vehicles with a hot film mass air flow (MAF) sensor. This parameter indicates the mass of air flowing through the MAF sensor in kilograms per hour (kg/h). At normal hot idle with all accessories switched off, expect readings to range from 10 to 30 kg/h.

AIRFLOW (V)_XX.X (range 0 to 12.0 V)
Mass Air Flow Sensor

This parameter displays the actual voltage from the airflow meter or mass airflow sensor.

With an airflow meter, the variable voltage signal represents the volume of the inducted air. The signal is generated by a potentiometer attached to the airflow meter sensing flap. With a mass airflow sensor, the parameter is the voltage required to maintain a 155°C temperature in the heated circuit of the mass airflow sensor.

Ranges vary slightly between systems. Typically, at a hot unloaded idle, with all accessories off, readings range from 0.5 to 1.5 volts.

On early systems, the Scanner may display a different mass airflow voltage than the BMW factory tool. Before suspecting a mass airflow sensor problem, monitor how readings change over different operating conditions and use the O2S and fuel trim values to help identify a mass airflow sensor problem. Verify sensor voltage with a Vantage power graphing meter or a lab scope.

ASC INTERVENT_XXX (range: ON/OFF)

This parameter indicates whether the Automatic Stability Control (ASC) system is on. The ASC system turns on in the presence of severe drive wheel slippage. On ELM (drive-by-wire) electronic throttle systems, the throttle is electronically regulated. On other systems, a

real-in cable closes the ASC throttle plate, reducing intake air flow. The ASC throttle plate lies upstream from the main throttle plate, allowing the ASC system to control airflow regardless of how far the driver is depressing the accelerator pedal. The ASC system works in conjunction with the antilock brake system, and other systems that together modify throttle position, ignition timing, and fuel injection.

AT SWITCH_XXXXX (range: P-N--/R-DL)

This parameter indicates the position of the gear selector lever and the signal of the park/neutral switch. Reads P-N-- when the selector is in park or neutral and reads -R-DL when the selector is in reverse or any forward gear. The park/neutral switch is closed (grounded) in park or neutral to allow starter motor engagement, and open in all other positions to prevent starter operation.

BATT (V)_XX.X (range: 0 to 25.5 volts)

This parameter is an ECU calculated value of battery voltage based upon a sensing circuit across the supply voltage circuit. Readings should be close to regulated charging system voltage with the engine running, typically 13.5 to 14.5 volts at idle. Compare displayed value to voltmeter measurements taken across the battery terminals. The ECU uses this parameter primarily for self-diagnostic purposes. However, the ECU may modify some functions if readings are too high or too low.

BRAKE SW_XXX (range: ON/OFF)

This parameter indicates the position of the brake pedal. Reads ON when the pedal is depressed and the brakes are applied, and reads OFF when the pedal is released and the brakes are not applied.

BRAKE TEST SW_XXX (range: ON/OFF)

This parameter is a backup to the BRAKE SW parameter. Readings vary by model. On some applications, readings are identical to those for the BRAKE SW, on others readings are opposite to those for the BRAKE SW.

CAMBANK1(°)_XXX (range: not available)

CAMBANK2(°)_XXX

Used on vehicles with the Dual VANOS (dual bank variable camshaft timing) system. These parameters indicate *intake* camshaft position. Normally, these parameters display 0.9 degrees at idle and 25 degrees at 2,500 rpm. For a normal running engine at idle readings usually range from +5 to -5 degrees.

CAMBANK1 refers to that cylinder bank that includes cylinder #1. On North American models, cylinder #1 is on the passenger (right) side, or bank, of the vehicle. CAMBANK2 refers to driver (left) side bank.

THR VALVE1(V)_XX.X
THR VALVE2(V)_XX.X

(range: variable)

These parameters indicate the signal voltage from the throttle actuator valve sensors used on drive-by-wire systems. BMW uses two different systems: the MDK Hybrid drive-by-wire and the EML full drive by wire system. The MDK Hybrid system uses an overriding clutch that allows the traction and cruise control systems to control the throttle opening independent of accelerator pedal position. This system uses two accelerator pedal and two throttle actuator valve sensors, all located at the throttle body. The ECU relies on the second set of sensors for validation. If the first sensor fails, the ECU switches to the second sensor. The ECU always uses the lowest of the two sensor readings. If both signals are incorrect or readings are not plausible, the ECM switches to limp-home mode, which allows only a limited engine speed. The accelerator pedal controls the accelerator pedal position sensors using a throttle cable.

For MDK Hybrid drive-by-wire systems, the range is 0.5 to 4.5 volts. The two parameters should be very close to each other in value.

The EML full drive by wire system *does not* use an overriding clutch. This system uses an accelerator pedal position sensor located at the accelerator pedal along with a throttle actuator valve sensor that is located at the throttle body. The ECU relies on the sensors to validate each other. If one sensor fails, the ECU operates based on the second sensor. The ECU also lowers the engine speed to idle when the brake pedal is depressed. Moving the throttle plate should bring about a proportional and simultaneous change in both sensor signal voltages.

For EML Full Drive By Wire systems, the range for THR VALVE1 is 0.5 to 4.5 volts. The range for THR VALVE2 is 4.5 to 0.5 volts. When added together, the voltage values from both parameters should equal approximately 5 volts.

THROTTLE(%)_XXX

(range: 0 to 100%)

This parameter indicates the percentage of throttle opening. The ECU calculates this value from the throttle position sensor (TPS) voltage signal. The greater the percentage, the wider the throttle opening.

TPS ADAPT(%)_XXX

(range: 0 to 100%)

Adaptation, throttle-valve potentiometer

This parameter is an ECU-learned corrective value for the throttle position sensor (TPS) idle stop setting. As an engine ages, the ECU adjusts the idle stop to maintain the idle speed at original specifications. The greater the value, the greater the ECU compensation.

TPS(V)_X.XX

(range: 0 to 5.10 volts)

This parameter indicates the voltage signal from the throttle position sensor (TPS). The greater the voltage, the greater the throttle opening. Typically, at idle expect a value of 0.5 volts, and at wide open throttle, 4.5 volts. If the ECU detects a TPS circuit malfunction, the ECU substitutes a calculated value based on engine speed and the mass air flow (MAF) sensor for the TPS signal.

VANOS_XXXXXXX

(range: RETARD/ADVANCE)

VANOS 1_XXXXXXX**VANOS 2_XXXXXXX****Variable cam timing**

These parameters indicate whether the Variable Camshaft Control (VANOS) system is commanding the intake camshaft(s) into retard or advance positions.

The VANOS system adjusts the intake camshaft timing for all engine operating conditions to optimize engine performance, reduce exhaust emissions, and improve fuel economy. The system increases torque at the lower to mid-range engine speeds without sacrificing upper speed range power. Both of the intake camshafts can be adjusted simultaneously to a maximum of 20° of their rotational axis.

The VANOS system receives inputs from the engine speed, mass airflow (MAF), engine coolant temperature (ECT), and camshaft position (CMP) sensors. On some versions, VANOS also receives input from the oil temperature sensor.

To adjust timing, VANOS energizes and de-energizes a solenoid that changes the position of a hydraulically controlled piston. To RETARD timing, VANOS de-energizes the solenoid; to ADVANCE timing, VANOS energizes the solenoid.

VEH SPEED(KMH)_XXX

(range: not available)

VEH SPEED(MPH)_XXX

This parameter indicates the vehicle speed based on the vehicle speed sensor (VSS) input signal to the ECU. From the CUSTOM SETUP menu you can change the units from KMH to MPH.

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