

Document title Display operating conditions, function

Document number gf5430p3041fl

MODEL 212**Function requirements, general**

- Terminal 15 ON

i The electronic ignition lock control unit (N73) transmits the circuit status of circuit 15 over interior CAN (CAN B) to the instrument cluster (A1).

Display operating conditions, general

The operating conditions display provides the driver with information about the current operating conditions of the vehicle.

The "display operating conditions" function comprises the following subfunctions:

- **Display of speed function sequence**
- **Display of engine speed function sequence**

Display of speed function sequence

The vehicle speed is calculated on the basis of the wheel speeds. The wheel speeds are recorded by the left front axle rpm sensor (L6/1), right front axle rpm sensor (L6/2), left rear axle rpm sensor (L6/3) and right rear axle rpm sensor (L6/4).

Display of engine speed function sequence

The engine speed is detected by the crankshaft position sensor (L5) (with engine 651 except CODE B03 (ECO start/stop function) or engine 271.958 with CODE 924 (Bivalent natural gas drive)) or by the crankshaft Hall sensor (B70) (with engine 156, 157, 271.8, 272, 273, 276, 278, 642 or with engine 651 with CODE B03 (ECO start/stop function)).

The CDI control unit (N3/9) (with diesel engine) or the ME-SFI control unit (N3/10) (with gasoline engine) reads in the signals from the crankshaft position sensor or the crankshaft Hall sensor directly, uses them to calculate the engine speed and sends the corresponding value to the instrument cluster up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 1, the front SAM control unit and chassis CAN 2. The instrument cluster receives the value for the engine speed and actuates the tachometer (A1p5) accordingly by way of a stepper motor.

Display of coolant temperature function sequence

The coolant temperature is recorded by the coolant temperature sensor (B11/4). The CDI control unit or the ME-SFI control unit reads in the signal from the coolant temperature sensor directly, uses the signal to calculate the coolant temperature and sends the corresponding value to the instrument cluster up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 1, the front SAM control unit and chassis CAN 2. The instrument cluster receives the value for the coolant temperature and actuates the coolant temperature display (A1p1) accordingly by way of a stepper motor.

The coolant temperature gauge is actuated via a correction characteristic. This correction characteristic defines the following four temperature ranges in which the coolant temperature display is actuated in different ways:

T = 0 to 80 °C:

The actual coolant temperature is displayed. It is displayed from T = 40 °C and higher.

T = 80 to 115 °C:

The coolant temperature display pointer is actuated constantly to a value of T = 90 °C.

- **Display of coolant temperature function sequence**
- **Function sequence for power display (model 212.095/098/298)**
- **Function sequence for display of charge level for high-voltage battery (A100g1) (model 212.095/098/298)**
- **Display of travel distance function sequence**
- **Display of fuel quantity function sequence**
- **Function sequence for gear display and transmission mode display**
- **Function sequence for "ECO" display (with CODE B03 (ECO start/stop function))**
- **Function sequence for transport mode display (as of 01.06.2012)**

The Electronic Stability Program control unit (N30/4) (model 212 (except 212.074/075/076/077/092/095/098/274/275/276/277/292/298) except CODE 233 (DISTRONIC PLUS)) or the regenerative braking system control unit (N30/6) (model 212.095/098/298) or the Premium Electronic Stability Program control unit (N30/7) (model 212 (except 212.095/098/298) with CODE 233 (DISTRONIC PLUS), model 212.074/075/076/077/092/274/275/276/277/292) reads in the signals from the rpm sensors directly and sends them to the instrument cluster up to 28.02.2013 via the chassis CAN (CAN E) or as of 01.03.2013 via chassis CAN 1 (CAN E1), the front SAM control unit with fuse and relay module (N10/1) and chassis CAN 2 (CAN E2).

The instrument cluster calculates the current vehicle speed, compares it against an internally stored speedometer characteristic, and then actuates the speedometer (A1p8) to match by way of a stepper motor.

i MODEL 212.095/098/298

The "Dynamic tachometer" interface is used for displaying the engine speed.

The display needle is suppressed by the CDI control unit or the ME-SFI control unit and not - as usual - using the algorithm filed in the instrument cluster.

T = 115 to 120 °C:

The coolant temperature display pointer is actuated constantly to a value of T = 95 °C.

T = 120 to 130 °C (start of red warning zone):

The actual coolant temperature is displayed. When a coolant temperature of T > 130 °C is reached, the coolant temperature warning lamp (A1e54) is also permanently actuated and a warning message is issued via the multifunction display (A1p13).

i MODEL 212.095/098/298

The "Coolant" display can be called up in the "Service" menu.

i If a faulty combustion engine and air conditioning fan motor with integrated control (M4/7) is detected, the actual coolant temperature is displayed. The coolant temperature warning lamp is also actuated.

If the instrument cluster does not receive any value for the coolant temperature, it actuates the coolant temperature warning lamp. The coolant temperature display is not actuated.

Function sequence for power display (model 212.095/098/298)

The output at any given time is shown as a percentage on the power display indicator (A1p19) in the instrument cluster. The instrument cluster calculates the display values using the status that it receives from the power electronics control unit (N129/1) via the hybrid CAN (CAN L), CDI control unit or ME-SFI control unit and, up to 28.02.2013, via the chassis CAN or, as of 01.03.2013, via chassis CAN 1, the front SAM control unit and chassis CAN 2.

The battery management system control unit (N82/2) evaluates the data for the high-voltage battery and sends the corresponding values to the

The charge level of the high-voltage battery is shown as a battery symbol with power data as a percentage in the multifunction display.

Display of travel distance function sequence

The instrument cluster calculates the travel distance from the signals received from the rpm sensors taking the tire circumference into consideration.

The Electronic Stability Program control unit or the regenerative braking system control unit reads in the signals from the rpm sensors directly and sends these signals to the instrument cluster up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 1, the front SAM control unit and chassis CAN 2.

i The tire size is coded via the diagnostics tester.

Display of fuel quantity function sequence

The fill level of the fuel tank is detected by the left fuel level indicator sensor (B4/1) and right fuel level indicator sensor (B4/2). The rear SAM control unit with fuse and relay module (N10/2) reads in the signals from the fuel level indicator sensor directly and sends them via the interior CAN to the instrument cluster. The instrument cluster receives the signals for the fuel level indicator sensor, calculates them and then actuates the fuel level indicator (A1p2) to match by means of a stepper motor.

If the reserve range has been reached (approx. 12.5 % of maximum tank capacity), the instrument cluster actuates the fuel reserve warning lamp (A1e4). A corresponding message is shown on the multifunction display. The reserve range is defined by comparing the measured fill level against a stored tank characteristic.

If the reserve range drops to approx. 50 %, a gas station symbol in the form of a gasoline pump is shown in the Range menu instead of the distance reading.

Display characteristics of fuel level indicator:

- After switching on circuit 15, the current fill level is displayed. In the process the pointer runs up in a buffered manner.

Function sequence for gear display and transmission mode display

The gear and transmission mode display is realized on the instrument cluster's multifunction display.

Gear indicator:

The information for the gear indicator is sent via the drive train CAN to the CDI control unit or the ME-SFI control unit by the electronic selector lever module control unit (N15/5) on vehicles with transmission 722.6 and by the intelligent servo module for DIRECT SELECT (A80) on vehicles with transmission 722.9.

The CDI control unit or the ME-SFI control unit forwards this information to the instrument cluster up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 1, the front SAM control unit and chassis CAN 2.

Function sequence for "ECO" display (with CODE B03 (ECO start/stop function))

The automatic engine start/stop is automatically activated following each change of ignition, and it can be activated or deactivated by pressing the ECO start/stop function button (N72/1s50) in the UCP control unit (N72/1). The status of the ECO start/stop function button is read in by the upper control panel control unit and sent via instrument panel LIN (LIN 1) to the front SAM control unit.

The front SAM control unit sends the status to the ME-SFI control unit up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 1.

Function sequence for transport mode display (as of 01.06.2012)

Transport mode is activated at the factory at the end of the product process and sets the entire vehicle to a defined special state (e.g. limited vehicle speed or restricted outside lamp functions).

The transport mode remains active on its way from the production plant to the dealers and company-owned sales and service outlets around the world up to the so-called delivery inspection and the final handover to the end customers.

instrument cluster via the hybrid CAN, CDI control unit or ME-SFI control unit and, up to 28.02.2013, via the chassis CAN or, as of 01.03.2013, via chassis CAN 1, the front SAM control unit and chassis CAN 2.

The total distance display is shown in the multifunction display. The maximum displayed counter reading of the main odometer reading is 999.999. The display then overflows to 0. However, the actual kilometer reading continues to be stored internally in the instrument cluster.

The trip distance is shown in the multifunction display. The maximum displayed counter reading of the trip distance is 9999.9. If this value is reached, the figure returns to 0. The main odometer reading is saved continuously to the nonvolatile part of the instrument cluster's internal memory.

i This memory guarantees the retention of the counter reading for at least five years even when the on-board electrical system battery (G1) is disconnected.

The current reading of the trip distance is likewise stored in the nonvolatile memory of the instrument cluster.

- After an engine start the display value for $t = 4$ s is updated every $t = 0.8$ s, to maintain a value below the full on-board electrical system voltage. After this time, or as soon as the vehicle starts off, the display is updated with a delay.
- When circuit 15 is switched off, the pointer gradually moves back to zero.

i Possible jamming of the fuel level indicator sensor is detected by comparing the change in fill level of the fuel tank with the calculated composite mileage. If the fill level drops faster over a specific distance than is technically feasible based on the composite mileage, the fuel level indicator sensor is deemed to be defective and a corresponding message issued on the multifunction display.

On vehicles with engine 271.958 and CODE 924 (Bivalent natural gas drive), the fill level of the gas reservoir is shown in the basic display of the multifunction display in the form of a bar graph, irrespective of the current operating mode.

In natural gas operation the fill level indicator in the multifunction display, is joined at the right of the outside temperature indicator by a symbol that shows the rough natural gas level.

For this purpose, the CNG control unit (N118/2) sends corresponding information to the ME-SFI control unit up to 28.02.2013 via the drive train CAN (CAN C) or as of 01.03.2013 via the drive train sensor CAN (CAN I). The ME-SFI control unit sends this information to the instrument cluster up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 1, the front SAM control unit and chassis CAN 2.

The instrument cluster receives this data and then issues a corresponding display on the multifunction display.

Transmission mode display:

The information for the transmission mode display is sent via the drive train CAN to the CDI control unit or the ME-SFI control unit by the electronic transmission control control unit (N15/3) on vehicles with transmission 722.6 and by the fully integrated transmission control unit (Y3/8n4) on vehicles with transmission 722.9 (except 722.930/931/971), 724 or 725.

The CDI control unit or the ME-SFI control unit forwards this information to the instrument cluster up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 1, the front SAM control unit and chassis CAN 2.

On vehicles with transmission 722.930/931/971, the transmission mode control unit (N145) sends the corresponding information to the instrument cluster up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 2.

If the function requirements are fulfilled, the driver is notified of the automatic engine start/stop readiness by the "ECO" symbol in the instrument cluster's multifunction display. The request for this is sent to the instrument cluster by the ME-SFI control unit up to 28.02.2013 via the chassis CAN or as of 01.03.2013 via chassis CAN 1, the front SAM control unit and chassis CAN 2.

i If, while the vehicle is being driven, the ME-SFI control unit detects on the basis of the currently available parameters that an automatic engine stop is possible but neutral has not been engaged, the gearshift recommendation "→ N" is shown in the multifunction display.

In active transport mode, the message "Transport mode" and the charge condition of the on-board electrical system battery are shown in the multifunction display in the form of a bar graph with 40 stages.

i Detailed information on the operating state of the transport mode is given in the separate "Energy management" function description.

		MODEL 212 as of model year 2014	PE54.30-P-2055-97DAB
	Overview of system components, instrument cluster (IC) component description		GF54.30-P-9996FL