

USER MANUAL

DR-Audi Digital Dashboard User Manual

Product Line Audi Coupe, Coupe Quattro, Quattro/Sport, 80 (B2), 90, 4000 |

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PHOL-LABS Kft

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1 Precautions

This chapter consolidates the mandatory safety rules that accompany every DR-Audi instrument cluster. Ignoring any of these items is the fastest way to damage the electronics or obtain unreliable readings.

1. Disconnect the vehicle battery before starting the installation. Working on a powered harness feels faster, but several dashboards have already been destroyed by short circuits caused by a live loom.
2. Never feed the sensor inputs with an external voltage source. The coolant temperature, oil temperature, outside temperature, and fuel level channels are designed for passive sensors only. Even a “harmless” test through a resistor burns the measurement circuitry.
3. Remember that the dashboard contains no internal fuse. The first protective element is the vehicle fuse box and it reacts too late to save the cluster from wiring mistakes.
4. Shield the unit from direct sunlight. Prolonged exposure washes out the LCD segments and permanently reduces contrast.
5. Do not attempt to overdrive the LED backlight. The illumination uses fixed-current drivers. If the daytime image is dim, add shading around the binnacle rather than increasing the drive current.
6. Beware of resonances in cable-driven speedometers. Mechanical drives often oscillate at 40–60 km/h. Fit the supplied electronic sensor whenever possible.
7. Plan external MFA controls where required. Vehicles without the Audi steering-column switch need the auxiliary harness connected so MFA functions remain accessible.

2 Introduction

This operating manual covers the DR-Audi digital instrument cluster for Audi Coupe, Coupe Quattro, Quattro/Sport, 80 (B2), 90, and 4000 vehicles. It summarises the hardware variants, describes their functions, and explains how to install, configure, operate, store, and maintain the dashboard. The guidance is intended for vehicle owners, automotive electricians, and service centres that retrofit the product.

The chapters that follow detail the model identification scheme, connector pin-outs, operating conditions, and installation procedures required to replace the factory instrumentation. Maintenance, configuration, and troubleshooting references ensure the instrument panel can be serviced without relying on the original Russian-language documentation.



(a) Installed DR-Audi Green dashboard.



(b) Delivery set for the GART-AG package.



(c) Installed DR-Audi Red dashboard.



(d) Package contents prepared for shipment.

Figure 2.1: Representative DR-Audi instrument panels and accessories.

Each variant ships with the components required for its intended vehicle harness,

and later chapters decode the product markings, provide wiring tables, and outline the configuration workflow.

3 Description and operation of the product

3.1 Purpose

The DR-Audi digital dashboard replaces the original Audi instrument cluster while extending its functionality. It provides fully electronic indications for vehicle speed, engine speed, coolant status, fuel level, multifunction computer (MFA) calculations, and warning lamps. All variants ship with LED-based displays, a tachometer scale in every configuration, and either a Bluetooth or miniUIOD Wi-Fi controller for configuration and diagnostics.

3.2 Model identification

Each dashboard is marked with the package code listed in [section 3.2](#). Both variants are assembled units with a remote electronic speed sensor harness and differ only by the colour of the front panel illumination.

Model	Description
GART-AR	Petrol applications, assembled unit with remote electronic speed sensor, dual connectors, red illumination.
GART-AG	Petrol applications, assembled unit with remote electronic speed sensor, dual connectors, green illumination.

3.3 Connector pin-outs

Main 10-pin connector

The 10-pin plug groups the negative returns for the indicator lamps and sensor leads. All positive feeds originate from the companion 12-pin connector.

Pin	Assignment
1	Coolant warning lamp return (temperature indicator negative).
2	Voltage stabiliser output/input (normally unused).
3	Ground (KL 31).
4	Not connected.
5	Coolant temperature sensor input.
6	ABS warning lamp return (“ABS AUS”).
7	Temperature warning lamp driver return (flasher board “L”).
8	Oil pressure warning lamp return.
9	Brake warning lamp return.
10	Battery/charging indicator return.

Main 12-pin connector

The second connector supplies the positive feeds and sensor inputs required by the dashboard.

Pin	Assignment
1	Shared positive feed for indicators (turn signals, battery, handbrake, oil, coolant) — KL 15.
2	Not connected.
3	Turn-signal indicator return (combined left/right).
4	Hazard indicator positive feed.
5	Rear-window defrost indicator positive feed.
6	Front lamp heating/fog indicator positive feed.
7	High-beam indicator positive feed.
8	Fuel level sender input.
9	Tachometer input (KL 1 ignition signal).
10	Permanent +12 V (KL 30).
11	Lamp flasher supply (bridged to pin 1).
12	Backlight supply.

3.4 Steering-column switch harness

The auxiliary harness for the steering-column switch provides six conductors:

1. MFA mode selection.
2. MFA memory block selection.
3. MFA reset.
4. Ambient temperature sensor (optional).
5. Oil temperature sensor (optional).
6. Vehicle ground.

3.5 Alternative Audi wiring variant

Some Audi vehicles use a second connector mapping. When encountered, repin the vehicle harness to match the standard layout described above. The factory configuration typically follows the tables below.

Alternative 10-pin mapping

Pin	Assignment
1	Voltage stabiliser output (positive, unused).
2	Not connected.
3	Not connected.
4	Shared ground for the clock, backlight, and stabiliser (KL 31).
5	High-beam indicator.
6	Oil pressure warning lamp.
7	Turn-signal input (KL 49).
8	Turn-signal indicator return.
9	Coolant temperature sensor.
10	Oxygen sensor warning lamp.

Alternative 12-pin mapping

Pin	Assignment
1	Seatbelt warning lamp.
2	Parking brake warning lamp.
3	Hazard indicator lamp.
4	Ground (KL 31).
5	Alternator warning lamp.
6	Fuel level sender.
7	EGR indicator (+, unused).
8	EGR indicator (-, unused).
9	Ignition-switched +12 V (KL 15).
10	Tachometer input (KL 1).
11	Clock supply (KL 31).
12	Backlight supply.

Repinning procedure

Perform the conversion step by step:

1. Extract the terminals from the vehicle connectors using a small screwdriver or terminal tool.
2. Confirm that pin 4 on both the 10-pin and 12-pin plugs is bonded to chassis ground.
3. Move the chosen ground wire from pin 4 to pin 3 of the 10-pin plug.
4. Relocate the wire from pin 9 of the 12-pin plug to pin 1 of the same connector.
5. Connect both vehicle connectors to the dashboard, switch on the ignition, and verify that the panel powers up before proceeding.
6. Bridge pin 1 of the 10-pin connector to pin 2 of the same connector.

7. Connect pin 5 of the 10-pin connector to pin 7 of the 12-pin connector (high beam) and verify the indicator.
8. Route pin 6 of the 10-pin connector to pin 8 of the 10-pin connector.
9. Move pin 8 of the 10-pin connector to pin 3 of the 12-pin connector; confirm that the turn indicators operate. Use pin 7 if the indicators remain inactive.
10. Connect pin 9 of the 10-pin connector to pin 5 of the same connector (coolant temperature sensor).
11. Leave the oxygen-sensor warning lamp (10-pin pin 10) disconnected unless the optional internal connector is used.
12. Seatbelt and parking-brake warning lamps (12-pin pins 1 and 2) are available on the internal auxiliary connector; connection is optional.
13. Jumper pin 3 of the 12-pin connector to pin 4 of the same connector.
14. Tie pin 5 of the 12-pin connector to pin 10 of the 10-pin connector (alternator lamp).
15. Connect pin 6 of the 12-pin connector to pin 8 of the 12-pin connector (fuel-level sender).
16. Bridge pin 10 of the 12-pin connector to pin 9 of the same connector.
17. Leave pin 12 of the 12-pin connector in place.
18. Label any unused wires and secure them out of the way.

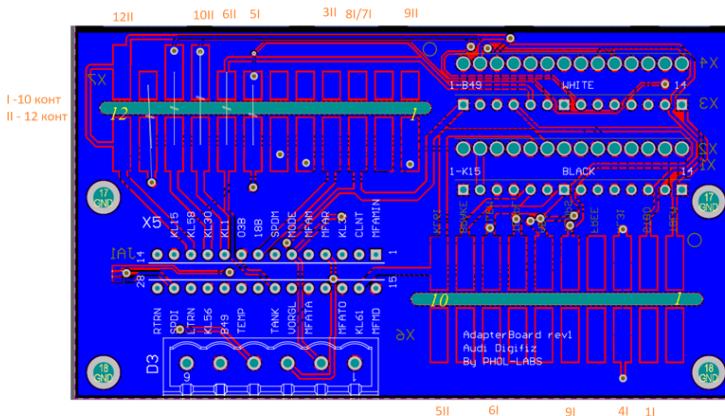


Figure 3.1: Repinning diagram for vehicles with the alternative Audi harness.

3.6 Service connector

A 14-position service connector inside the housing mirrors the external wiring and exposes additional diagnostics. The pin assignments differ slightly between the red and green versions; both are summarised below.

Pin	DR-Audi Red service connector
1	Seatbelt indicator (+).
2	Speed sensor input.
3	Vehicle ground.
4	Rear-window defrost indicator (+).
5	Left turn-signal input (BLL).
6	Right turn-signal input (BLR).
7	Ignition-switched supply.
8	Brake indicator (+).
9	Front lamp heating indicator (+).
10	Reserved fault indicator (+).
11	ABS indicator (+).
12	Reserved.
13	Check-engine indicator (-).
14	Reserved.

Pin	DR-Audi Green service connector
1	Not connected.
2	Speed sensor input.
3	Vehicle ground.
4	Rear-window defrost indicator (+).
5	Left turn-signal input (BLL).
6	Right turn-signal input (BLR).
7	Ignition-switched supply.
8	Brake indicator (+).
9	Front lamp heating indicator (+).
10	Reserved fault indicator (+).
11	ABS indicator (+).
12	Reserved.
13	Check-engine indicator (-).
14	Reserved.

3.7 Supplied equipment

Each delivery set includes the dashboard assembly, a USBasp programmer, and a speed-sensor harness. Electronic speed sensors or cable-drive adapters are supplied according to the selected vehicle kit.

Operating Principle

The DR-Audi dashboard reuses the original Audi housing, vehicle connectors, and either the factory mechanical speedometer cable or an electronic speed sensor supplied with the kit. The electronics are mounted on a fiberglass PCB populated with discrete components driven by an ATmega 2560 microcontroller. Seven-segment indicators are controlled by MAX 7219 and STLED316 driver ICs that manage the anode and cathode matrices of the LED displays.

The faceplate integrates the LED indication block, and the module is powered directly from the vehicle harness without a standby supply; no leakage current is present when the ignition is off. The dashboard tolerates input voltages from 9 V to 24 V DC and reads the vehicle sensors through the wiring described in [chapter 3](#).

Both the Bluetooth and miniUIOD-equipped variants share the same display layout and MFA pages, ensuring that installation and day-to-day operation remain consistent regardless of the configuration interface.

5 Technical specifications

The DR-Audi dashboard draws no leakage current when switched off and operates from the vehicle electrical system between 9 V and 24 V DC.

5.1 Measurement capabilities

- Vehicle speed: measured through the factory cable or electronic speed sensor. The systematic error is 10 km/h, the relative error is 3 km/h, and the indication saturates at 999 km/h (or mph for imperial units).
- Engine speed: derived from the ignition signal via an optocoupler stage with a 430 nF/1.2 kΩ RC network and a diode limiter. The absolute and relative errors are within 200 rpm.
- Fuel level: read from the resistive tank sender with an uncertainty of approximately 10 litres.
- Coolant temperature: indicated qualitatively using the standard thermistor connected through the vehicle harness; quantitative values are not displayed.
- Timekeeping: maintained to within one minute.
- Indicator lamps: direction indicators, high beam, oil pressure warnings, generator status, handbrake, rear window heating or diesel glow-plug, and front and rear fog lights.

6 Operating conditions and safety precautions

6.1 Environmental limits

- The instrument panel operates between -40°C and $+70^{\circ}\text{C}$ at relative humidity up to 95 %.
- The dashboard may remain installed inside the vehicle throughout the year, including when the car is parked for extended periods.

6.2 Safety precautions

1. The DR-Audi dashboard is a do-it-yourself device assembled and integrated by enthusiasts. Observe general electrical safety practices while working with it.
2. The product is intended for the personal projects of vehicle owners.
3. The readings are not certified or metrologically verified, although they correspond to the declared specifications at the time of release.
4. Use the dashboard only when you accept responsibility for the installation and for road safety.
5. If the displayed data cannot be trusted, verify it with the vehicle's standard gauges or external measuring instruments.
6. Do not use the instrument panel outputs for automatic vehicle control systems.
7. The authors accept no liability for consequences arising from the installation or use of the dashboard, including traffic fines or accidents. Malfunctions reported within the warranty period (one year for installations performed jointly with the authors and two weeks for independent installations) will be repaired.
8. The functional capabilities listed in Chapter 5^{→ p.13} are guaranteed for one year during supervised installation and for two weeks after independent installation.

7 Preparation for work and work order

7.1 Preparing the vehicle

Follow the sequence below when replacing the factory cluster with the DR-Audi dashboard:

1. Remove the plastic trim covering the pedals and the lower dashboard to expose the original instrument panel.
2. Disconnect the vehicle battery.
3. Unplug the wiring harness from the factory instrument panel.
4. Detach the mechanical speedometer cable, if present.
5. Unscrew the panel from its brackets and carefully remove it from the vehicle.
6. Route the supplied speed sensor harness and optional temperature probes as required.
7. Install the DR-Audi dashboard into the bracket grooves and secure it with screws.
8. Connect the steering-column switch harness if the vehicle requires external MFA controls.
9. If the vehicle uses the alternative Audi pin-out, repin the connectors according to [chapter 3](#) before reconnecting the harness.
10. Plug the connectors into the dashboard.
11. Fit the electronic speed sensor or reconnect the mechanical cable.
12. Reinstall the dashboard trim and pedal cover in the reverse order.

7.2 Operating the dashboard

- The dashboard powers up automatically with the ignition. The sidelights switch controls the backlight.
- At start-up the entire speed scale illuminates while internal diagnostics stabilise the RPM model; the display then settles on the current idle speed.
- Once the vehicle begins to move, the system reports the parameters listed in [Chapter 5 → p.13](#).

MFA functions

Six MFA pages are available:

1. Daily operating time.
2. Trip distance.
3. Fuel consumption (available when the necessary sensors are fitted).
4. Average speed (displayed as the value multiplied by ten).
5. Engine oil temperature (external harness required).
6. Ambient temperature (external harness required).

The Audi-specific dashboards use the steering-column switch to control MFA pages; on vehicles without the switch a short press of the front touch button cycles the modes. Touch durations behave as follows:

- Short press (< 1 s): cycle to the next MFA function.
- Medium press (1–3 s when no steering-column switch is fitted): switch between MFA memory blocks; the change is indicated on screen.
- Long press (3–7 s): reset the active MFA function (affecting consumption, trip distance, elapsed time, and average speed).

Backlight and indicator layout

The dashboard offers automatic brightness driven by a photodiode and manual override through the configuration interfaces described in [Chapters 8 and 10 → p.??](#).

The layout of the horizontal indicator block and the on-screen legend are shown in [Figure 7.1](#).

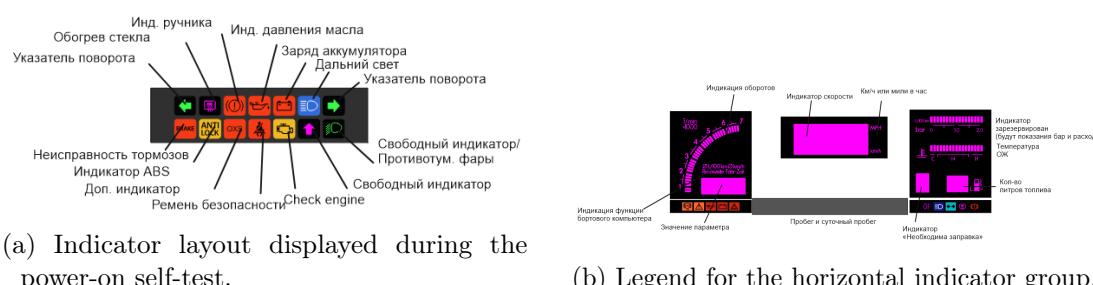


Figure 7.1: Instrument panel indication scheme.

Configuration interfaces

- Bluetooth-equipped dashboards use a Bluetooth 2.0 module. Install the Serial Bluetooth Terminal application from Google Play, pair with the dashboard,

and issue commands directly from the terminal view. Apple iOS devices cannot connect to this module.

- miniUIOD variants expose an embedded Wi-Fi access point and configuration portal described in [Chapter 8^{→ p.18}](#). Disable mobile data while connecting to ensure the captive portal loads correctly.

Both generations can also be powered and configured on the bench using the USBasp programming interface.

8 miniUIOD configuration and maintenance

The miniUIOD module adds a Wi-Fi configuration interface to the DR-Audi dashboard. The hardware layout is shown in [Figure 8.1](#).



[Figure 8.1: miniUIOD controller installed inside the DR-Audi dashboard.](#)

8.1 Panel handling

- Protect the UV-printed polycarbonate faceplate from scratches and foreign objects. Significant damage requires replacement parts from PHOL-LABS Kft and is not treated as a warranty case.
- The real-time clock is configured via the Wi-Fi control panel. It resets whenever the permanent supply is disconnected.

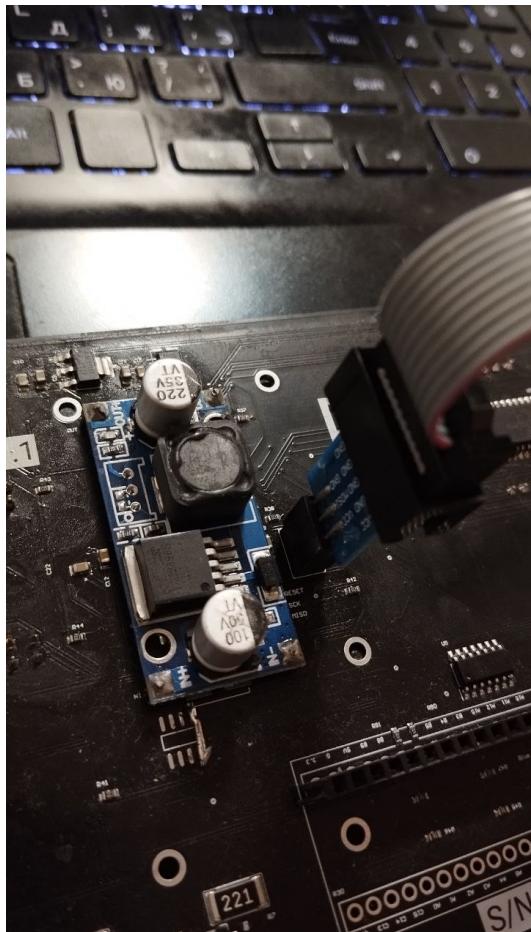
8.2 Wi-Fi control portal

Configuration, data collection, and firmware management are performed through the embedded web application.

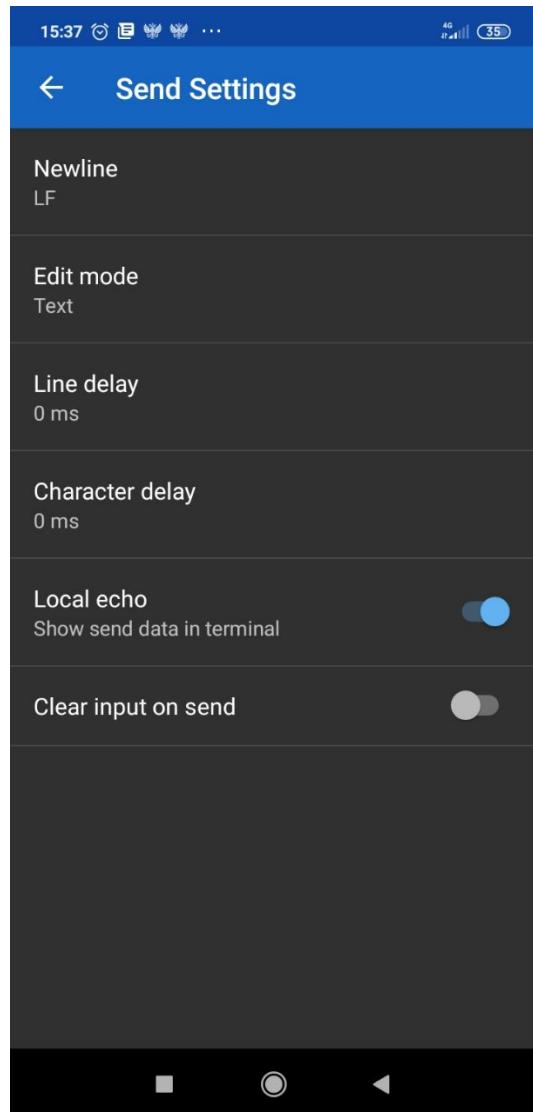
- Connect to the dashboard's Wi-Fi access point. Disable mobile data and join DigiFiz_AP (password 87654321); some revisions advertise PHOL-LABS2 with the same password.
- The default IP address is 192.168.4.1. If the dashboard is configured to join another network, scan the subnet for an address ending in .32 using an IP tools application.
- The portal contains the tabs WiFi, Control, Settings, Colors, and About ([Figure 8.2](#)). The WiFi tab configures network settings and handles firmware uploads; the Control tab adjusts dashboard parameters; the Settings tab provides a structured editor for all firmware parameters; the Colors tab manages multi-segment colour schemes; the About tab lists author information.

8.3 Command entry

The Control tab provides a command input line (1), a Process button (2), a result window (3), quick controls (4), a Save button (5), and a Reset button (6).



(a) Control tab overview.



(b) Numbered controls and command entry fields.

Figure 8.2: miniUIOD Wi-Fi control interface.

Enter commands as space-separated pairs <number> <value> using integers only; punctuation and quotation marks are not required. [Figure 8.3](#) illustrates the interface while toggling automatic brightness.

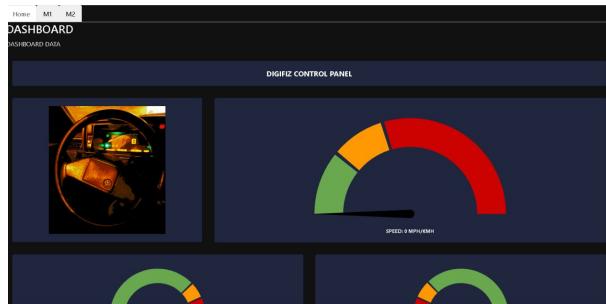


Figure 8.3: Example command sequence disabling automatic brightness.

8.4 Command reference

8.5 Default values

8.6 Reading parameters and examples

To read a parameter, add 128 to the command number (for example, 129 0 reports the speed coefficient). Typical commands include disabling automatic brightness (13 0), enabling it again (13 1), adjusting the speed coefficient (1 110 increases the displayed speed by 10%), and setting the odometer (11 123456). Clock values are set with 255 <hours> followed by 254 <minutes>.

8.7 Service commands

Recent firmware revisions accept human-readable parameter names, for example PARAMETER_RPMCOEFFICIENT 3000. The diagnostic command adc 0 prints raw ADC readings for sensor troubleshooting. Firmware updates add visual colour controls, so update regularly through the WiFi tab to access the latest features.

8.8 Settings tab parameter editor

The Settings tab mirrors the parameter list in [Table 8.4](#) and [Table 8.5](#) while adding metadata about ranges, descriptions, and data types. Use it whenever you prefer a graphical workflow instead of typing command numbers.

8.9 Custom colour schemes

The Colors tab introduces a segment-based editor for the WS2812 LED backlight. Press Load Scheme to read the active mapping, adjust the ranges, and use Set

Command	Name	Description
22 (or 0)	PARAMETER_RPMCOEFFICIENT	Engine RPM calibration factor (100–10000).
1	PARAMETER_SPEEDCOEFICIENT	Speed calibration factor (10–255).
2	PARAMETER_COOLANTTHERMISTORB	Coolant thermistor beta coefficient (2000–5000).
3	PARAMETER_OILTHERMISTORB	Oil thermistor beta coefficient (2000–5000).
4	PARAMETER_AIRTHERMISTORB	Ambient thermistor beta coefficient (2000–5000).
5	PARAMETER_TANKMINRESISTANCE	Minimum fuel sender resistance (0–1000 Ω).
6	PARAMETER_TANKMAXRESISTANCE	Maximum fuel sender resistance (100–1000 Ω).
7	PARAMETER_TAU_COOLANT	Coolant temperature filter constant (1–50).
8	PARAMETER_TAU_OIL	Oil temperature filter constant (1–50).
9	PARAMETER_TAU_AIR	Ambient temperature filter constant (1–50).
10	PARAMETER_TAU_TANK	Fuel level filter constant (1–50).
11	PARAMETER_MILEAGE	Total odometer value (0–999999).
12	PARAMETER_DAILY_MILEAGE	Trip odometer (0–9999).
13	PARAMETER_AUTO_BRIGHTNESS	Automatic brightness enable (1=on, 0=off).
14	PARAMETER_BRIGHTNESS_LEVEL	Manual brightness level (0–60%; values above 60 reduce LED life).
15	PARAMETER_TANK_CAPACITY	Fuel tank capacity in litres (0–99).
16	PARAMETER_MFA_STATE	Active MFA mode (normally controlled via hardware input).
17	PARAMETER_BUZZER_OFF	Disable buzzer (1 disables, 0 enables).
18	PARAMETER_MAX_RPM	Tachometer scaling (typical 7000 or 8000).
19	PARAMETER_NORMAL_RESISTANCE_COOLANT	Coolant sensor resistance at 25 °C (1000–10000 Ω).
20	PARAMETER_NORMAL_RESISTANCE_OIL	Oil sensor resistance at 25 °C (1000–10000 Ω).
21	PARAMETER_NORMAL_RESISTANCE_AMB	Ambient sensor resistance at 25 °C (1000–10000 Ω).
23	PARAMETER_DOT_OFF	Clock colon behaviour (0=blink, 1=solid).
24	PARAMETER_BACKLIGHT_ON	Enable backlight on low beam.
25	PARAMETER_M_D_FILTER	Median filter constant (legacy, normally unused).
26	PARAMETER_COOLANT_MAX_R	Coolant sensor threshold for full-scale indication.
27	PARAMETER_COOLANT_MIN_R	Coolant sensor threshold for “1 bar” indication.
31–33	PARAMETER_MAINCOLOR_[RGB]	User interface colour components.
37	PARAMETER_RPM_FILTER	RPM filter aggressiveness (10–200).
128	PARAMETER_READ_ADDITION	Add 128 to read the current value of any command.
255	PARAMETER_SET_HOUR	Set clock hours (24-hour format).
254	PARAMETER_SET_MINUTE	Set clock minutes.
253	PARAMETER_RESET_DAILY_MILEAGE	Reset the trip odometer.
252	PARAMETER_RESET_DIGIFIZ	Factory reset of stored parameters.

Table 8.4: Primary miniUIOD configuration commands.

Parameter	Default	Notes
PARAMETER_RPMCOEFFICIENT	3000	Typical for Audi ignition inputs.
PARAMETER_SPEEDCOEFICIENT	100	Calibrated for 100 km/h.
PARAMETER_COOLANTTHERMISTORB	4000	
PARAMETER_OILTHERMISTORB	4000	
PARAMETER_AIRTHERMISTORB	3812	
PARAMETER_TANKMINRESISTANCE	35	Ω .
PARAMETER_TANKMAXRESISTANCE	265	Ω .
PARAMETER_TAU_COOLANT	2	Filter constant.
PARAMETER_TAU_OIL	2	Filter constant.
PARAMETER_TAU_AIR	2	Filter constant.
PARAMETER_TAU_TANK	2	Filter constant.
PARAMETER_MILEAGE	Vehicle-specific	Retains stored odometer.
PARAMETER_DAILY_MILEAGE	0	
PARAMETER_AUTO_BRIGHTNESS	1	Enabled.
PARAMETER_BRIGHTNESS_LEVEL	25	Manual brightness (adjust if auto mode is disabled).
PARAMETER_TANK_CAPACITY	63	Litres.
PARAMETER_MFA_STATE	0	Default MFA page.
PARAMETER_BUZZER_OFF	1	Buzzer disabled.
PARAMETER_MAX_RPM	8000	Tachometer scale.
PARAMETER_NORMAL_RESISTANCE_COOLANT	1000	Ω at 25 °C.
PARAMETER_NORMAL_RESISTANCE_OIL	1000	Ω at 25 °C.
PARAMETER_NORMAL_RESISTANCE_AMB	2991	Ω at 25 °C.
PARAMETER_DOT_OFF	0	Blinking clock colon.
PARAMETER_BACKLIGHT_ON	1	Backlight enabled with low beam.
PARAMETER_M_D_FILTER	65535	Legacy median filter constant.
PARAMETER_COOLANT_MAX_R	120	°C.
PARAMETER_COOLANT_MIN_R	60	°C.
PARAMETER_MAINCOLOR_R	180	Yellow-green default.
PARAMETER_MAINCOLOR_G	240	Yellow-green default.
PARAMETER_MAINCOLOR_B	6	Yellow-green default.
PARAMETER_RPM_FILTER	70	Filter response.
PARAMETER_UPTIME	0	Runtime counter.

Table 8.5: Default miniUIOD settings for the DR-Audi dashboard.

Scheme to upload the new layout. Immediately switch to the Control tab and press Save parameters; otherwise the scheme is lost after a reboot. Optional export/import buttons let you back up the JSON representation of the layout.

If you later disable the custom colour scheme flag in the Settings tab, the dashboard falls back to the classic single-colour mode driven by PARAMETER_MAINCOLOR_R/G/B.

9 Typical situations for using the miniUIOD interface

Hotspot not visible Move closer to the vehicle and ensure it is parked in an open area. Disable mobile data, forget stale Wi-Fi profiles, and reconnect to Diginiz_AP (or PHOL-LABS2).

404 at 192.168.4.1 Turn off mobile data on the phone or laptop and reload the page. Captive portal detection on Android/iOS often interferes until the cellular modem is disabled.

Firmware updates Open the WiFi tab and select the supplied Diginiz.bin file. The latest releases are published at the link below.

<https://github.com/Sgw32/DiginizReplica/releases>

Click Upload. The first attempt can fail; repeat the upload if necessary. Successful flashes redirect to a confirmation page. Record the odometer before updating and restore it afterwards with 11 <mileage>.

Commands ignored Refresh the browser, return to the Control tab, and resend the command. Ensure the Process button is pressed after entering the value.

Speed reading incorrect Connect via Wi-Fi, drive at an indicated 100 km/h, note the GPS speed, then issue 1 <gps_value> (for example, 1 85) to set PARAMETER_SPEEDCOEEFICIENT to the verified value.

RPM reading incorrect Adjust PARAMETER_RPMCOEFFICIENT. Older firmware uses 0 <value>; current versions use 22 <value>. Example: 22 1500 halves the reading relative to 22 3000.

Display too dim Disable automatic brightness with 13 0, then raise the manual level (for example, 14 50). Experiment with values between 45 and 55; avoid levels above 60 to preserve LED life.

Setting the clock Use the web terminal (or Serial Bluetooth Terminal on legacy builds) to send 255 <hours> followed by 254 <minutes>. Example: 255 23 and 254 55 sets 23:55.

Fuel readings stuck Disconnect the battery and measure the resistance between the fuel sender pin and vehicle ground. Valid readings are typically 30–300 Ω. Repair shorts below 5 Ω or open circuits before reconnecting. If the readings vary correctly but the gauge does not, record adc 0 results at several fuel levels and share them with PHOL-LABS Kft.

Fuel flow readings inaccurate The optional flow sensor produces emulated data and is unreliable without an intake manifold pressure sensor. Treat the readings

as experimental.

Coolant temperature out of range Tune PARAMETER_COOLANT_MIN_R and PARAMETER_COOLANT_MAX_R. Example: 27 30 lowers the “1 bar” threshold to 30 °C.

Oil or ambient temperature missing With the battery disconnected and the engine cold, measure the sensor resistance. Oil sensors should read about $2\text{ k}\Omega \pm 0.3\text{ k}\Omega$, ambient sensors about $10\text{ k}\Omega \pm 2\text{ k}\Omega$. Adjust PARAMETER_NORMAL_RESISTANCE_OIL (command 20) or PARAMETER_NORMAL_RESISTANCE_AMB (command 21); lower values decrease the indicated temperature, higher values increase it. Persistent issues should be diagnosed by collecting adc 0 output and contacting PHOL-LABS Kft.

Changing interface colour Use commands 31–33 to set the RGB values. New firmware revisions include visual colour controls in the web interface, so update regularly.

10 Setup and maintenance of the DR-Audi

This chapter applies to all DR-Audi instrument panels supplied with this manual.

10.1 Handling and screen care

- The plexiglass front with UV printing is easily marred. Avoid contact with sharp or abrasive objects.
- Surface damage is cosmetic and not covered by warranty. Request replacement parts from PHOL-LABS Kft if the screen pattern is deformed.

10.2 Real-time clock battery

The dashboard contains a DS3231 real-time clock with a CR2032 cell. The battery typically lasts about four years. When it is depleted the clock resets at every power-up. Remove the front and/or rear cover, keep the wiring harnesses connected, and replace the coin cell. Dispose of the spent battery according to local regulations.

10.3 Firmware maintenance with USBasp

Each kit ships with a USBasp programmer lead already connected inside the housing. Install a suitable USBasp driver before flashing. For example, download it from the following address:

<https://myrobot.ru/downloads/driver-usbaspx-v-2.0-usb-isp-windows-7-8-10-xp.php>

The programmer powers the dashboard when it is connected to a computer, allowing bench checks.

Flash firmware with avrdude using the command below (replace the firmware filename if required):

```
avrdude -c usbaspx -p m2560 -e \
-U lfuse:w:0xff:m -U hfuse:w:0x99:m -U efuse:w:0xff:m \
-U flash:w:Digifiz.ino.mega.hex
```

After a successful upload press the front touch button four to five times to initialise the memory blocks. If the blocks remain empty, repeat the flashing procedure or issue the Bluetooth command 252 0 to trigger a factory reset. Ready-to-use firmware images are published at:

<https://github.com/Sgw32/DigifizReplica>

10.4 Bluetooth configuration

Most parameters are adjusted over Bluetooth using an Android phone and the Serial Bluetooth Terminal application. Download it from the following link before pairing with the dashboard:

https://play.google.com/store/apps/details?id=de.kai_morich.serial_bluetooth_terminal&hl=en&gl=US

iOS devices cannot connect to the classic Bluetooth 2.0 module.

- Ensure you pair with the dashboard's Bluetooth Classic interface rather than BLE-only devices.
- In Serial Bluetooth Terminal set the end-of-line character to LF. Disable CR+LF before sending commands.

Enter commands as space-separated pairs <number> <value>. For example, to store an odometer value of 123 456 km send 11 123456. Add 128 to a command number to read its current value (129 0 reports the speed coefficient). The diagnostic command adc 0 prints raw sensor readings that help the developers analyse faults.

10.5 Configuration parameters

The primary configuration commands are listed in [Table 10.1](#). Default settings for the dashboard are summarised in [Table A.2](#). Commands 31–33 are only available on firmware revisions that support RGB colour adjustments.

Table 10.1: DR-Audi configuration commands.

ID	Name	Description
22 (or 0)	PARAMETER_RPMCOEFFICIENT	Engine RPM calibration factor.
1	PARAMETER_SPEEDCOEFFICIENT	Speed calibration factor.
2	PARAMETER_COOLANTTHERMISTORB	Coolant thermistor beta coefficient.
3	PARAMETER_OILTHERMISTORB	Oil thermistor beta coefficient.
4	PARAMETER_AIRTHERMISTORB	Ambient thermistor beta coefficient.
5	PARAMETER_TANKMINRESISTANCE	Minimum fuel sender resistance (Ω).
6	PARAMETER_TANKMAXRESISTANCE	Maximum fuel sender resistance (Ω).
7	PARAMETER_TAU_COOLANT	Coolant temperature filter constant.
8	PARAMETER_TAU_OIL	Oil temperature filter constant.
9	PARAMETER_TAU_AIR	Ambient temperature filter constant.
10	PARAMETER_TAU_TANK	Fuel level filter constant.
11	PARAMETER_MILEAGE	Total odometer value.
12	PARAMETER_DAILY_MILEAGE	Trip odometer.

Continued on next page

Table 10.1: DR-Audi configuration commands. (Continued)

13	PARAMETER_AUTO_BRIGHTNESS	Enable automatic brightness adjustment.
14	PARAMETER_BRIGHTNESS_LEVEL	Manual brightness level (0–15).
15	PARAMETER_TANK_CAPACITY	Fuel tank capacity (litres).
16	PARAMETER_MFA_STATE	Active MFA page.
17	PARAMETER_BUZZER_OFF	Disable the buzzer (1 disables, 0 enables).
18	PARAMETER_MAX_RPM	Tachometer scale (default 8000).
19	PARAMETER_NORMAL_RESISTANCE_COOLANT	Coolant sensor resistance at 25 °C.
20	PARAMETER_NORMAL_RESISTANCE_OIL	Oil sensor resistance at 25 °C.
21	PARAMETER_NORMAL_RESISTANCE_AMB	Ambient sensor resistance at 25 °C.
23	PARAMETER_DOT_OFF	Clock colon behaviour (0 blink, 1 solid).
24	PARAMETER_BACKLIGHT_ON	Switch on backlight with low beam.
25	PARAMETER_M_D_FILTER	Median filter constant (legacy).
26	PARAMETER_COOLANT_MAX_R	Coolant “full-scale” temperature threshold.
27	PARAMETER_COOLANT_MIN_R	Coolant “1 bar” temperature threshold.
31–33	PARAMETER_MAINCOLOR_[RGB]	Interface colour components (if supported by firmware).
37	PARAMETER_RPM_FILTER	RPM filtering aggressiveness.
128	PARAMETER_READ_ADDITION	Add to read any parameter.
255	PARAMETER_SET_HOUR	Set clock hours (24-hour).
254	PARAMETER_SET_MINUTE	Set clock minutes.
253	PARAMETER_RESET_DAILY_MILEAGE	Reset the trip odometer.
252	PARAMETER_RESET_DIGITAL	Factory reset and memory initialisation.

The Serial Bluetooth Terminal quick buttons are convenient for routine actions such as toggling automatic brightness (13 0 and 13 1) or writing colour values. Keep values above 60 % brightness only for short tests to preserve LED life.

11 Typical situations for setting up the DR-Audi

Before troubleshooting, confirm whether you are using the Bluetooth-based configuration workflow ([chapter 10](#)) or the miniUIOD Wi-Fi portal ([chapter 8](#)).

Bluetooth module not detected Pair with the dashboard's Bluetooth Classic interface (it normally advertises as Digifiz). Serial Bluetooth Terminal for Android remains the recommended tool: configure the end-of-line character as LF and avoid BLE-only scanners, which cannot discover the module.

iPhone or iPad cannot connect The Bluetooth 2.0 interface is incompatible with iOS devices. Use an Android phone or a computer running a Bluetooth serial utility.

Commands ignored on 2024+ firmware Unlock the command parser by sending 234 123, then repeat the desired sequence. Store quick-access buttons in Serial Bluetooth Terminal for the values you adjust frequently.

Speed reading too high or low Connect through Serial Bluetooth Terminal, drive at an indicated 100 km/h, and note the GPS speed. Send 1 <gps_value> (for example, 1 85) so PARAMETER_SPEEDCOEFFICIENT matches the verified GPS speed.

RPM reading incorrect Firmware prior to 2024 expects 0 <value> while current releases use 22 <value>. Audi engines typically need 22 3000; halve or double the value (for example, 22 1500 or 22 6000) until the display matches the tachometer.

Increase brightness Disable automatic control with 13 0 and raise the manual level with 14 <value>. Values between 45 and 55 brighten the display substantially; avoid levels above 60 to preserve LED life. Re-enable the photodiode later with 13 1.

Setting the clock Use Serial Bluetooth Terminal to send 255 <hours> followed by 254 <minutes>. Examples: 255 23, 254 55 sets 23:55; 255 14, 254 30 sets 14:30; 255 2, 254 28 sets 02:28.

Fuel gauge issues Disconnect the vehicle battery before probing.

- If the display drifts from 60 to 0, measure the sender resistance between the harness pin and ground; valid readings are typically 30–300 Ω. Clean the connector and confirm the signal reaches the main board.
- If the gauge is pegged full, look for a short to ground below 5 Ω on the sender line and repair it.

- If the reading never changes, compare the sender resistance with full and empty tanks. Replace the sensor if it stays constant.

Fuel flow values seem wrong. The flow channel is emulated unless an intake-manifold pressure sensor is fitted. Treat the reading as indicative rather than absolute.

Coolant gauge inaccurate. Adjust PARAMETER_COOLANT_MIN_R and PARAMETER_COOLANT_MAX_R. Example: 27 30 shortens the scale so that the “1 bar” mark aligns with roughly 30 °C.

Oil or ambient temperature readings missing. A reading of -999 or a stuck value indicates a sensor issue. With the battery disconnected and the engine cold, measure the sensor resistance between the harness pin and ground. Oil sensors should read about $2\text{ k}\Omega \pm 0.3\text{ k}\Omega$; ambient sensors about $10\text{ k}\Omega \pm 2\text{ k}\Omega$. Adjust PARAMETER_NORMAL_RESISTANCE_OIL (command 20) or PARAMETER_NORMAL_RESISTANCE_AMB (command 21) if the display needs fine-tuning. Persistent faults should be documented with adc 0 logs and escalated to PHOL-LABS Kft support.

Collect raw sensor data with adc 0 if the problem persists and share the results with the dashboard developers for analysis.

12

Marking and sealing

- Each dashboard carries a model code such as GART-AR (red illumination) or GART-AG (green illumination).
- Export batches can include additional markings applied by the importing organisation.
- The DR-Audi dashboard is not sealed; no tamper seals are fitted at the factory.

Package 13

Each DR-Audi delivery set contains the following components:

- The assembled dashboard module.
- A USBasp programmer with the internal harness pre-installed.
- A speed-sensor harness (cable-drive adapter or electronic sensor lead depending on the selected kit).

For transport, wrap the components in bubble wrap and place them in a rigid cardboard box. Alternative packaging is acceptable provided it protects the dashboard during transport and storage.

14 Storage and transportation rules

- Transportation conditions must comply with the general freight rules applicable to each transport mode (GOST 23216-78).
- Packaged dashboards may be shipped by road, rail, river, or air transport.
- Store the instrument panel inside the vehicle cabin or in a heated room between 15 °C and 40 °C. Protect the unit from direct sunlight, although storage behind vehicle glass is permissible.

A Reference Tables

A.1 DR-Audi Command Reference

The DR-Audi firmware shares most commands with the miniUIOD interface. Commands 31–33 (colour control) are only active on firmware revisions that support RGB configuration; other commands apply equally to the Bluetooth and Wi-Fi workflows.

A.2 DR-Audi Default Values

A.3 Change Log

Command	Name	Description
22(or0)	PARAMETER_RPMCOEFFICIENT	Engine RPM calibration factor.
1	PARAMETER_SPEEDCOEFFICIENT	Speed calibration factor.
2	PARAMETER_COOLANTTHERMISTORB	Coolant thermistor beta coefficient.
3	PARAMETER_OILTHERMISTORB	Oil thermistor beta coefficient.
4	PARAMETER_AIRTHERMISTORB	Ambient thermistor beta coefficient.
5	PARAMETER_TANKMINRESISTANCE	Minimum fuel sender resistance.
6	PARAMETER_TANKMAXRESISTANCE	Maximum fuel sender resistance.
7–10	PARAMETER_TAU_X	Filtering constants for coolant, oil, air, and fuel level.
11	PARAMETER_MILEAGE	Total odometer value.
12	PARAMETER_DAILY_MILEAGE	Trip odometer.
13	PARAMETER_AUTO_BRIGHTNESS	Automatic brightness enable.
14	PARAMETER_BRIGHTNESS_LEVEL	Manual brightness level.
15	PARAMETER_TANK_CAPACITY	Fuel tank capacity.
16	PARAMETER_MFA_STATE	Active MFA mode.
17	PARAMETER_BUZZER_OFF	Disable buzzer (if fitted).
18	PARAMETER_MAX_RPM	Tachometer scaling (7000 default).
19–21	PARAMETER_NORMAL_RESISTANCE_X	Sensor resistances at 25 °C for coolant, oil, and ambient inputs.
23	PARAMETER_DOT_OFF	Clock colon behaviour.
24	PARAMETER_BACKLIGHT_ON	Enable backlight when low beam is active.
25	PARAMETER_M_D_FILTER	Median filter constant.
26	PARAMETER_COOLANT_MAXIMUM_R	Coolant sensor threshold for full-scale indication.
27	PARAMETER_COOLANT_MIN_R	Coolant sensor threshold for “1 bar” indication.
31–33	PARAMETER_MAINCOLOR_[RGB]	UI colour components (RGB-enabled firmware only).
37	PARAMETER_RPM_FILTER	RPM filtering aggressiveness.
128	PARAMETER_READ_ADDITION	Add 128 to read the current value of a command.
255	PARAMETER_SET_HOUR	Set clock hours.
254	PARAMETER_SET_MINUTE	Set clock minutes.
253	PARAMETER_RESET_DAILY_MILEAGE	Reset trip odometer.
252	PARAMETER_RESET_DIGITAL	Factory reset of stored parameters.

Table A.1: Primary configuration commands for the DR-Audi dashboard.

Parameter	Default	Notes
PARAMETER_RPMC_OEFFICIENT	3000	
PARAMETER_SPEE_DCOEFFICIENT	100	
PARAMETER_COOL_ANTTHERMISTORB	4000	
PARAMETER_OILTH_ERMISTORB	4000	
PARAMETER_AIRT_HERMISTORB	3812	3600 on Gen 2.
PARAMETER_TANK_MINRESISTANCE	35	Ohms.
PARAMETER_TANK_MAXRESISTANCE	265	Ohms.
PARAMETER_TAU_COOLANT	2	
PARAMETER_TAU_OIL	2	
PARAMETER_TAU_AIR	2	
PARAMETER_TAU_TANK	2	
PARAMETER_MILEAGE	Vehicle-specific	Preserve existing odometer.
PARAMETER_DAILY_MILEAGE	0	
PARAMETER_AUTO_BRIGHTNESS	1	Enabled.
PARAMETER_BRIGHHTNESS_LEVEL	7 or 13	Typical Bluetooth defaults (25 on Wi-Fi units).
PARAMETER_TANK_CAPACITY	63	Litres.
PARAMETER_MFA_STATE	0	
PARAMETER_BUZZER_OFF	1	Buzzer disabled.
PARAMETER_MAX_RPM	8000	7000 on earlier clusters.
PARAMETER_NORM_AL_RESISTANCE_COOLANT	1000	Ω at 25 °C.
PARAMETER_NORM_AL_RESISTANCE_OIL	1000	Ω at 25 °C.
PARAMETER_NORM_AL_RESISTANCE_AMB	2991	Ω at 25 °C.
PARAMETER_DOT_OFF	0	Blinking colon.
PARAMETER_BACK_LIGHT_ON	1	Enabled.
PARAMETER_M_D_FILTER	65535	
PARAMETER_COOL_ANT_MAX_R	120	°C.
PARAMETER_COOL_ANT_MIN_R	60	°C.
PARAMETER_MAIN_COLOR_[RGB]	-	Colour commands active only on RGB-enabled firmware.
PARAMETER_RPM_FILTER	70	Draft - February 19, 2026
PARAMETER_UPTIME	0	

Change	Affected sheets	Date
1	04.10.2022	04 Oct 2022
2	31.08.2023	31 Aug 2023
3	05.08.2024	05 Aug 2024
4	LaTeX document introduced.	22.09.2025

Table A.3: Document change registration sheet.