Video inserter
CI-HDV-MBMC / CI-HDA-MBMC

Compatible with
Mercedes Benz
Actros 5 and Arocs vehicles
with Multimedia Cockpit with 10.25 inch monitor and 31pin radio connector

Example

Attention!
Video signal type of each video source must be selected in the OSD menu of the corresponding video input, if Auto Detection has no function.

Product features

- **1 x CVBS/AHD input for rear-view camera**
- **1 x CVBS/AHD input for front camera**
- **2 x CVBS/AHD input for side cameras or additional after-market video-sources (e.g. USB-AV player, DVB-T2 tuner, etc.)**
- **All inputs NTSC and PAL compatible**
  Supported AHD resolutions 720p NTSC (30Hz)**, 720p PAL** (25Hz)**, 960p NTSC** (30Hz)**, 960p PAL** (25Hz)**, 1080p NTSC** (30Hz)**, 1080p PAL** (25Hz)
- **HDV-MBMC only: 1 HDMI input for HD rear-view camera or other HDMI source (e.g. iOS/Android device, laptop, streaming stick, DVB-T2 tuner, etc.)**
  Supported HDMI resolutions 720p NTSC (60Hz)**, 720p PAL** (50Hz)**, 1080p NTSC** (60Hz)**, 1080p PAL** (50Hz)
- **Automatic switching to rear-view camera input while reverse gear is engaged**
- **Automatic front camera shift after reverse gear for 5, 10, 15 or 20 seconds**
- **Adjustable guide lines (fixed or movable) can be activated for rear-view camera (movable guide lines not available for all vehicles)**
- **Free picture while driving (only for inserted video sources)**

Table of contents

Legal notice

The driver must not be distracted either directly or indirectly by moving pictures while driving. This is prohibited by law in most countries/states. We therefore exclude all liability for damage to property and personal injury caused directly or indirectly by the installation and operation of this product. This product is only intended for displaying stationary menus (e.g. MP3 menu of USB devices) or pictures from (rear-view) cameras while driving, in addition to operation when stationary.

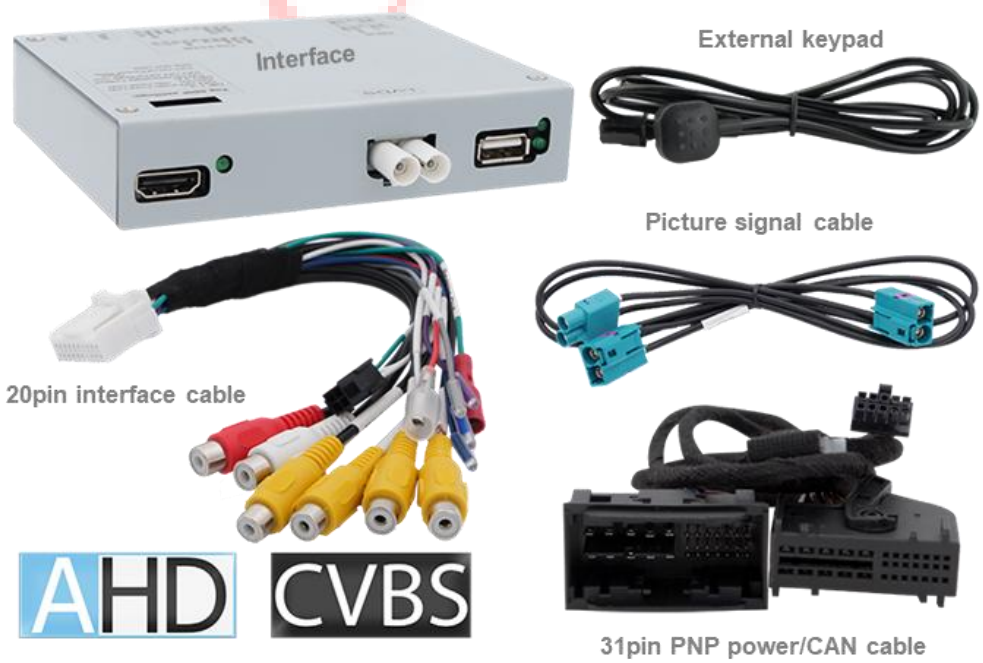
Changes/updates to the vehicle software may impair the functionality of the interface. Software updates for our interfaces are provided to customers free of charge for up to one year after purchase of the interface. The interface must be sent in free of charge for the update. Costs for installation and removal will not be reimbursed.

1 Before installation

These instructions must be read before installation. Specialist knowledge is required for installation. The installation location of the interface must not be near sources of moisture or heat.

Before final installation in the vehicle, we recommend a test run after connection to ensure that the vehicle and interface are compatible. Due to production-related changes made by the vehicle manufacturer, there is always the possibility of incompatibility.

1.1 Scope of delivery



Note the serial number of the interface and keep the instructions for support purposes: _____

1.2 Check interface compatibility with vehicle and accessories

Requirements

Manufacturer	Compatible vehicle models	Infotainment
Mercedes Benz	Actros 5 from MY 2018 Arocs from MY 2020	Multimedia cockpit with 10.25 inch monitor *with navigation or without navigation and with 31pin radio connector**

** The Multimedia Cockpit with 10.25 inch monitor is available with and without navigation. With navigation always has the 31pin radio connector, without navigation has either the 31pin or a 26pin radio connector. For the variant with 26pin radio male connector, the Male connector&Play cable set with the article number PNP-MBUX26P is optionally available. Alternatively, the 31pin version HDV-MBMC / HDA-MBMC can also be used for the 26pin version by disconnecting the 31pin male connector and female connector of the Male connector&Play cable set and installing the open cable ends on the factory harness - this option is described as a "special case" in these instructions.*

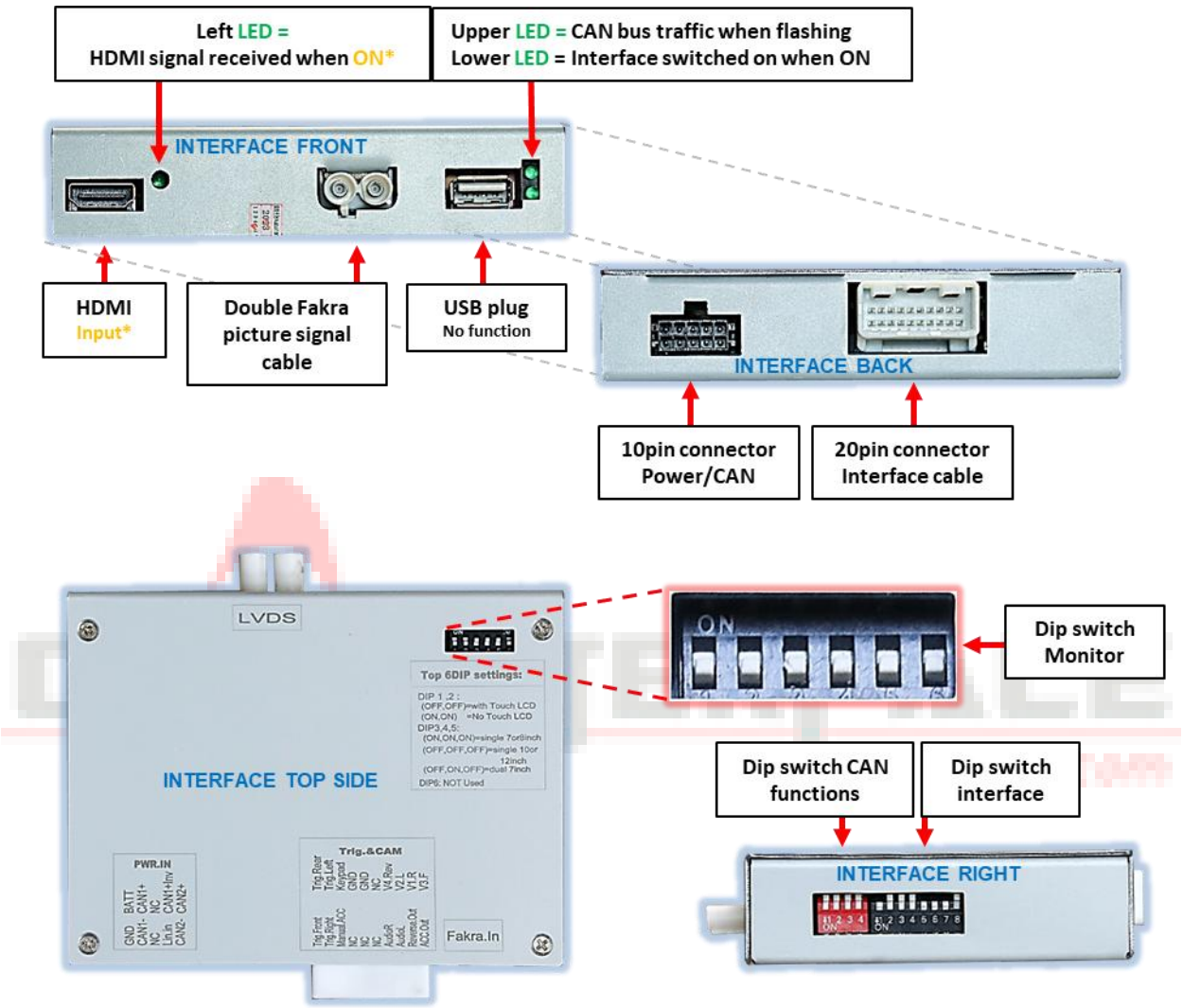
1.3 Limitations

Limitations

CAN bus compatibility	The CAN bus compatibility of the interface may be restricted in some vehicles, either completely or for individual functions. This may be noticeable both during installation and later. The interface with all video inputs can be operated with analogue switching signals without connection to the vehicle CAN bus. In this case, individual additional functions are omitted, see *chapter 2.4.2 Analogue connection without CAN bus*.
Video only	Interface **does not feed** in **any audio signals.** To feed in audio signals, any existing factory audio AUX input or optional products must be used (e.g. AUX-UNI0x).
Factory rear-view camera	Automatic switchover to rear-view camera input only takes place as long as reverse gear is engaged. Optional accessories are required for different switching times.
After-market front camera	Switching to front camera takes place automatically after reverse gear is engaged for 5, 10, 15 or 20 seconds (depending on the OSD menu setting). Manual switching to front camera is also possible via the external keypad.
Guide lines for rear-view camera	If the vehicle CAN bus is not fully compatible with the interface or if the connection is analogue, the moving guide lines function cannot be used.

1.4 Boxes and connections - Interface

The interface converts video signals from after-market sources into a video signal compatible with the factory head unit. This is fed into the factory monitor via various switching options. The interface also reads digital signals from the vehicle CAN bus and uses them for its own functions.



*** HDMI input only available with HDV-MBMC**

Interface box, right side, black

1.5 Settings – switch bench of 8 dip switches (interface functions)

Dip position **UP = OFF** and **DOWN = ON**

Dip	Function	ON (down)	OFF (up)
1	Video 1 / V1-Left	activated	deactivated
2	Video 2 / V2-Right	activated	deactivated
3	Front camera / V3 front	activated *	deactivated
4	Type of rear-view camera (V4-Rear)	After-Market	Plant or none
5	Connection type of the After-market rear-view camera*	HDMI*	V4 reverse (CVBS/AHD)
6	HDMI **input***	activated	deactivated
7	Monitor selection	-	10.25 inch monitor
8	Monitor selection	-	10.25 inch monitor

Power reset interface after each dip change to activate changes!

* Switching to front camera occurs automatically for 5, 10, 15 or 20 seconds (depending on the OSD menu setting) after shifting into reverse gear.

* With HDA-MBMC, dip 5 and dip 6 have no function. Set both to **OFF.**

See following chapters for detailed information about 8dip switch bench.

1.5.1 Interface video inputs V1-Left and V2-Right (Dip 1-2)

With Dip 1 (Dip 2) = **ON**, the CVBS/AHD input **V1-Left** (**V2-Right**) is activated for side camera or other video sources. Only activated video inputs can be accessed - both with automatic and manual switching. It is recommended to only activate used inputs, to avoid accidental switching.

1.5.2 Front camera input V3-Front (Dip 3)

If Dip 3 = **ON,** the interface switches to the CVBS/AHD front camera input **V3-Front** after the reverse gear has been selected. In addition, manual switching to the front camera input is possible from any picture mode using an external keypad (short press).

In the OSD menu settings, the automatic display time of the front camera can be selected between 5; 10; 15 or 20 seconds or switched off. Another video source could then also be connected to instead of a front camera.

1.5.3 Rear-view camera settings (dip 4)

If Dip 4 = **OFF,** the interface switches to the factory image for the existing factory rear-view camera or factory PDC display as long as reverse gear is engaged.
If Dip 4 = **ON,** the interface switches to its CVBS/AHD rear-view camera input **V4-Reverse** (provided Dip 5 is set to **OFF**) or the **HDMI input*** (provided Dip 5 and Dip 6 are set to **ON**) when reverse gear is engaged.

Note: **V4 reverse** remains without function when dip 5 = ON, using an HDMI camera.

1.5.4 Connection type of the rear-view camera (Dip 5)

Dip 5 = **ON** selects the **HDMI input*** as the rear-view camera input. In addition, the **HDMI** input must be activated with dip 6 = **ON**. Dip
5 = **OFF** selects the **V4-Reverse** input as the rear-view camera input.

Note: The automatic switchover to the front camera for the preset time is available in both cases after reverse gear is engaged.

1.5.5 HDMI input* (Dip 6)

With dip 6 = **ON**, the **HDMI** input* is activated and can be used for various HDMI sources (e.g. rear-view camera or 360° camera system, smartphone, laptop, streaming stick, DVB-T2 tuner, etc.) . For rear-view camera/360° camera system, dip 5 = **ON**.
With dip 6 = **OFF,** the **HDMI** input* is deactivated.

1.5.6 Monitor selection (Dip 7+8)

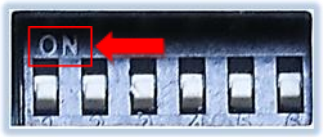
Dip 7+8 = **OFF** for 10.25 inch monitor.

*** HDMI input only available with HDV-MBMC**

Power reset interface after each dip change to activate changes!

Interface box, top side, black

1.6 Settings – Switch bench of 6 dip switches (monitor definition)



Attention: In contrast to the other switch benchs (8 and 4), the dip position for the 6 is UP = ON and DOWN = OFF!

Attention!
Flip the dip switches very carefully with a micro tool.

Monitor size	Dip 1	Dip 2	Dip 3	Dip 4	Dip 5	Dip 6
10.25 Monitor Actros 5 Multimedia Cockpit **with navigation**	OFF	OFF	OFF	OFF	OFF	OFF

In the event of picture or touch problems, also try the other dip switch settings!

Power reset interface after each change to activate changes!

dip

Interface box, right-hand side, red

1.7 Settings – Switch bench of 4 dip switches (CAN function - red)

Set the DIP switch positions according to the following table.

Dip position UP=OFF and DOWN=ON

Vehicle/Navigation	Dip 1	Dip 2	Dip 3	Dip 4
Actros 5 Multimedia Cockpit **with navigation**	OFF	OFF	OFF	OFF

Power reset interface after each dip change to activate changes!

2 Installation

Switch off the ignition and disconnect the vehicle battery according to the factory specifications!
If the vehicle battery must not be disconnected according to the factory specifications, in most cases it is sufficient to put the vehicle into sleep mode. If this does not work, disconnect the vehicle battery with a resistor cable.

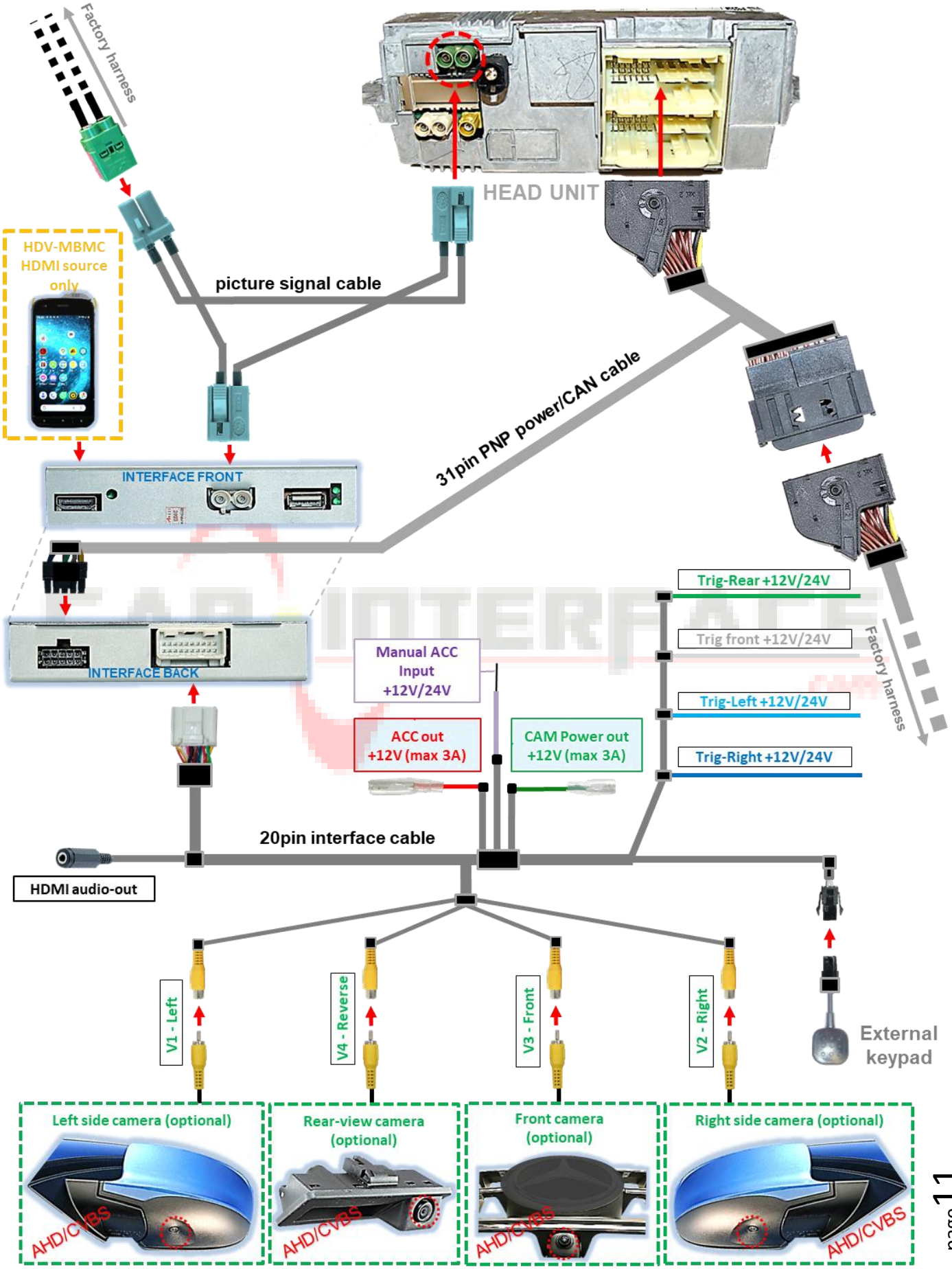
Before final installation, we recommend a test run of the interface with all connected devices to ensure that all parts are compatible. Due to possible changes in the vehicle manufacturer's production at any time, incompatibility can never be ruled out.

As with every installation of after-market devices, a quiescent current test of all after-market devices must be carried out after installation to ensure that the devices are switched off to standby mode in vehicle sleep mode.

2.1 Place of connection

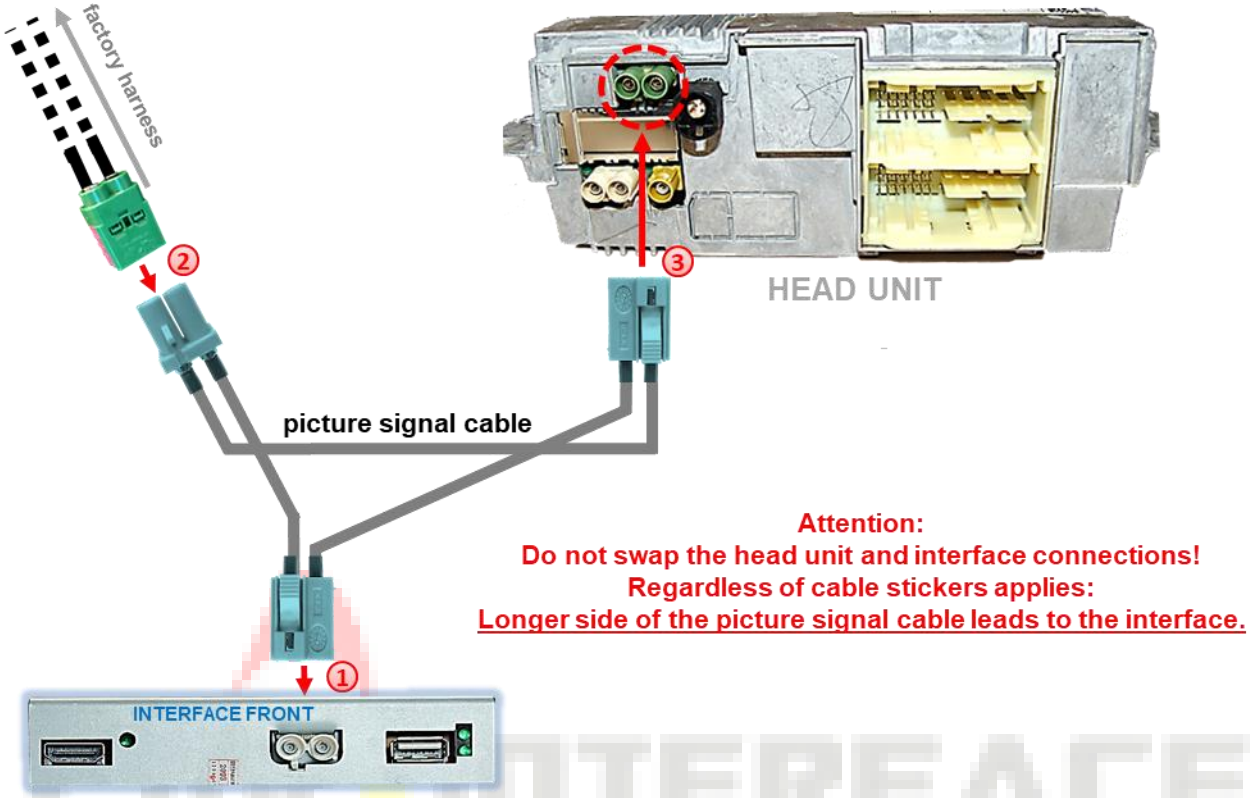
The video interface is installed on the passenger side above the footwell near the head unit and connected to the factory head unit.

2.2 Connection schema



2.3 Connection - picture signal cable

Attention: The picture signal cable is only connected to the double Fakra of the head unit, even if it is only used on one side!



1. Connect the water blue double Fakra female connector of the supplied picture signal cable to the double Fakra male connector of the video interface.

2. Disconnect the double Fakra female connector of the factory picture signal cable from the **green** double Fakra male connector of the head unit and connect it to the water blue double Fakra male connector of the picture signal cable supplied.

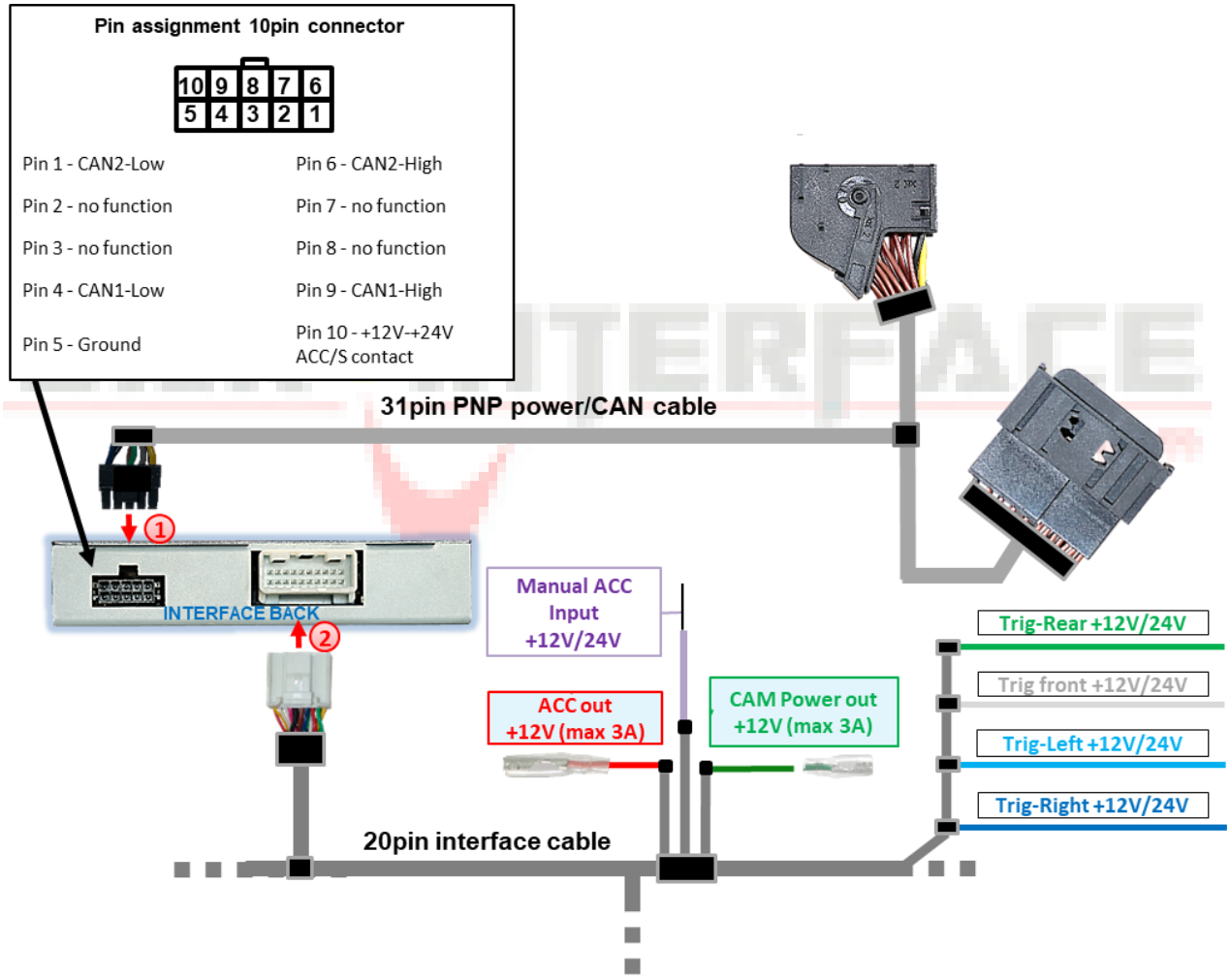
3. Connect the water blue double Fakra female connector of the supplied picture signal cable to the **green** double Fakra male connector of the head unit.

2.4 Connection - cable sets, power supply and CAN bus or analogue without CAN bus

The interface can be integrated via CAN-bus as well as operated in analogue mode without CAN-bus connection.

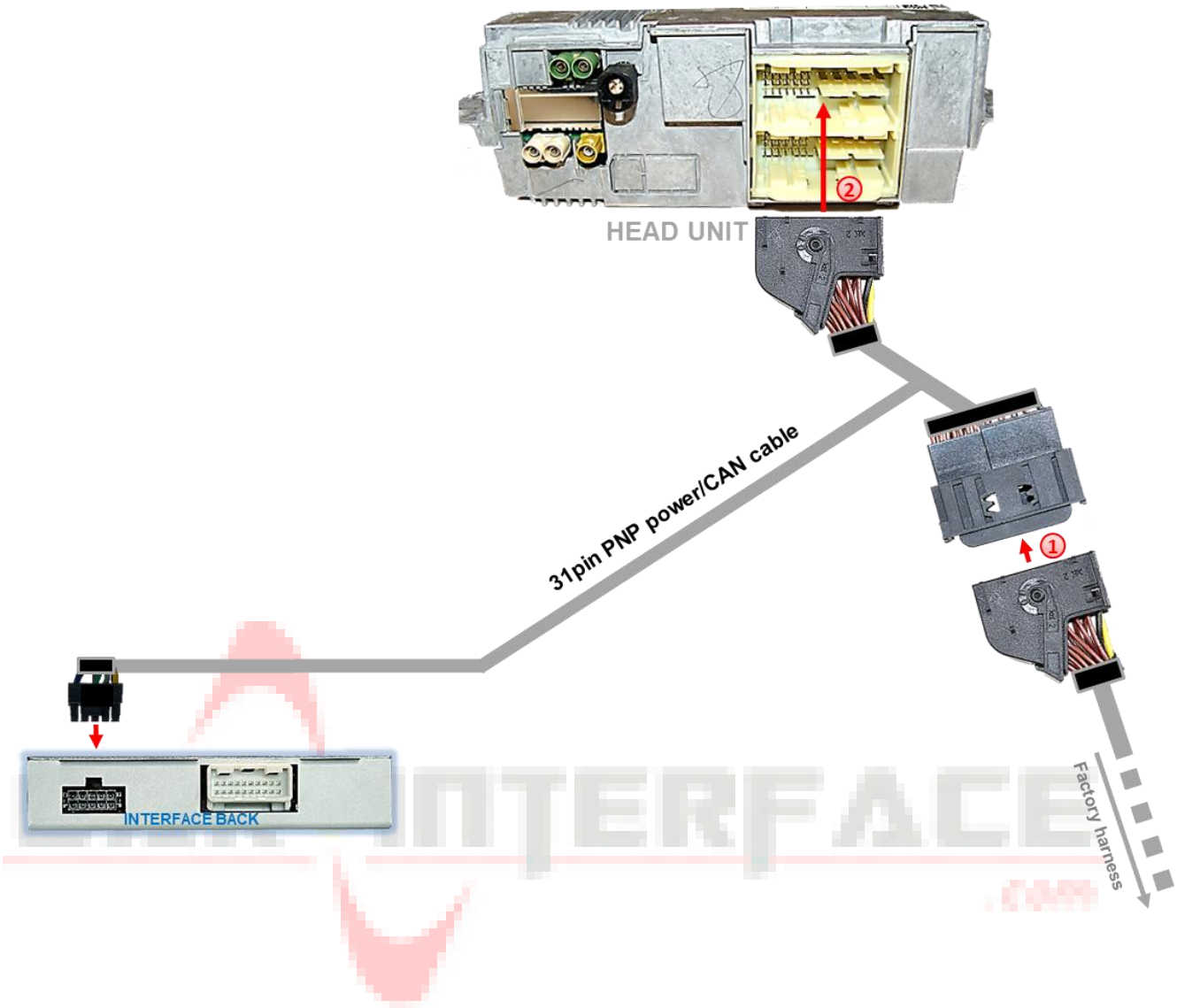
When integrated via CAN-bus, the interface is switched on by the vehicle CAN-bus and R-gear signal and turn signals are usually recognized. In some vehicles also movable guide lines can be displayed, using CAN-bus steering signals and parking sensor data.

In exceptional cases, CAN communication is not (fully) compatible. If no interface LED lights up after connecting the 31pin PNP power/CAN cable when the ignition is switched on, the analogue connection described below must be made. The analogue connection is also possible to avoid a possible subsequent CAN bus incompatibility. In this case, the interface must be both switched on and switched to its inputs via +12V switching inputs.
The display of movable guide lines for the rear-view camera is omitted with an analogue connection.



1. Connect the 10-pin female connector of the 31pin PNP power/CAN cable to the 10-pin male connector of the interface.
2. Connect the 20pin female connector of the 20pin interface cable to the 20pin male connector of the interface.

2.4.1 Connection with CAN bus

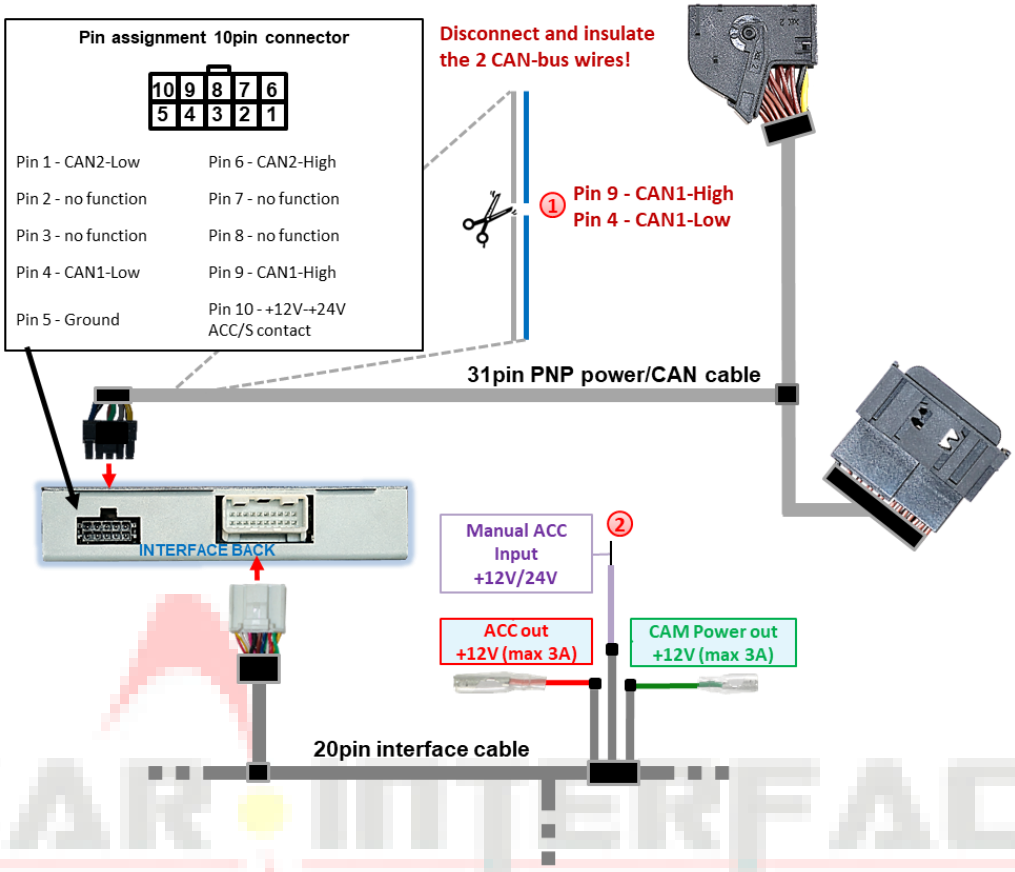


1. Disconnect the 31pin female connectors of the vehicle wiring harness at the rear of the head unit and connect them to the 31pin connectors of the **31pin PNP power/CAN cable.**
2. Connect the 31pin female connectors of the **31pin PNP power/CAN cable** to the previously vacated 31pin connector of the head unit.

Attention!
In exceptional cases, CAN communication is not (fully) compatible. If no interface LED lights up after connecting the 31pin PNP power/CAN cable set when the ignition is switched on, the analogue connection described below must be made.

2.4.2 Analogue connection without CAN bus

With an analogue connection, the two CAN wires of the 31pin PNP power/CAN cable are not connected - the two wires of the 31pin PNP power/CAN cable must be disconnected for this!



1. Disconnect and insulate the 2 CAN bus wires (grey, blue) of the 31pin PNP power/CAN cable approx. 4-5 cm behind the black connector.
2. Connect the violet wire Manual ACC of the 31pin PNP power/CAN cable to the +12V-+24V S-contact (terminal 86s) or ACC terminal 15r (e.g. cigarette lighter, glove compartment lighting).

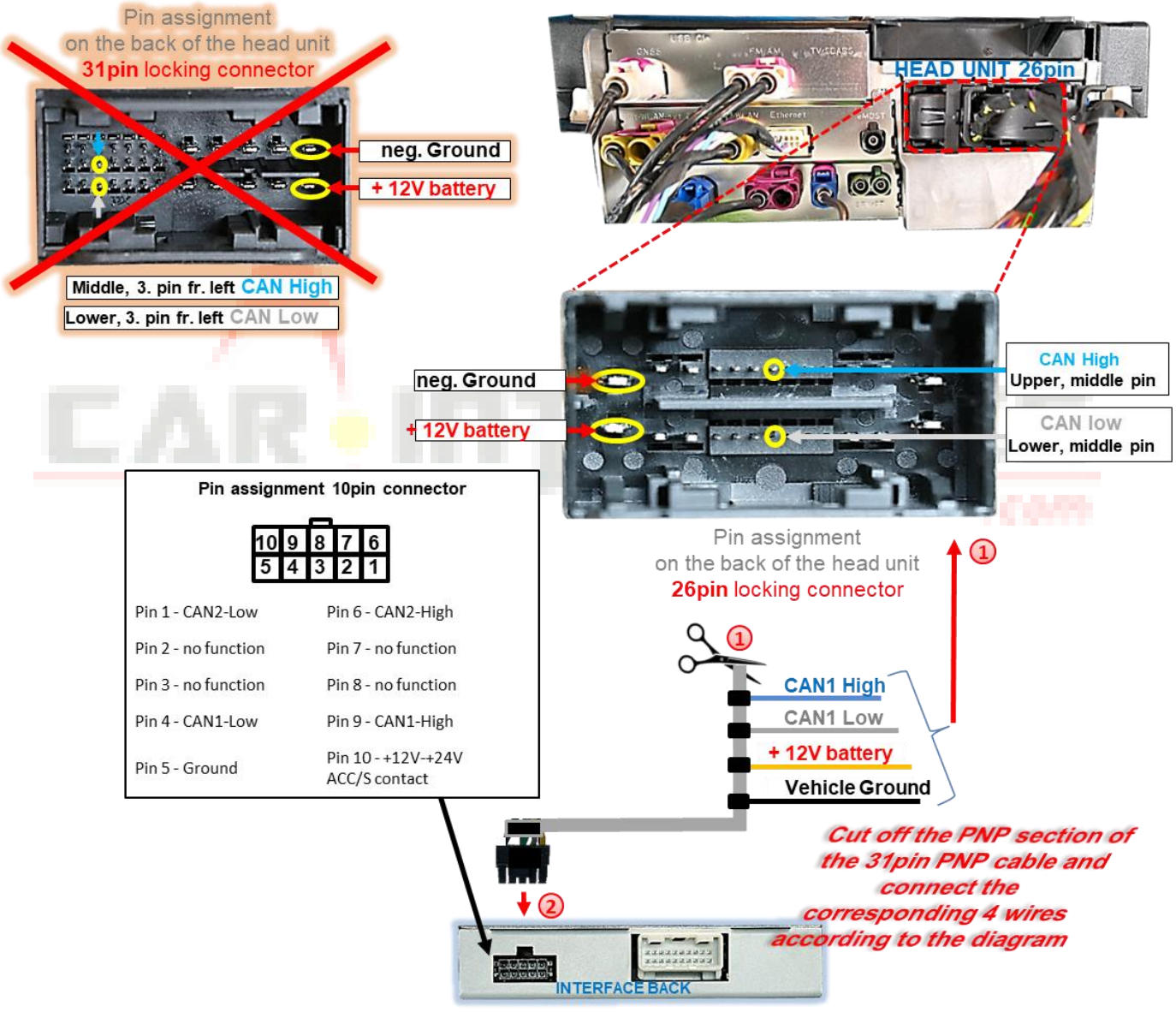
Notes

- The screen is only switched on as long as the video interface is switched on via +12V-+24V on Manual ACC. Otherwise, the factory picture is also black.
  When selecting the switch-on signal, it must be checked whether the factory picture is available in all desired operating states.
- The display of movable guide lines for the rear-view camera is omitted with an analogue connection.
- If the interface is connected analogue (without CAN bus), the rear-view camera and side cameras must also be connected analogue.
  See points:
  2.6.2 Case 2: Reverse gear signal analogue connection
  2.8.2 Case 2: Turn signals analogue connection

2.4.3 Special case head unit with 26pin connector

In exceptional cases, the manufacturer has installed head units with 26pin connectors (instead of 31pin connectors). In this case, the 26pin locking female connector of the factory harness remains connected in the 26pin locking male connector of the factory head unit and the corresponding power and CAN wires of the enclosed 31pin PNP power/CAN cable are connected to the factory harness. To do this, the unused PNP section of the enclosed 31pin PNP power/CAN cable must be disconnected.

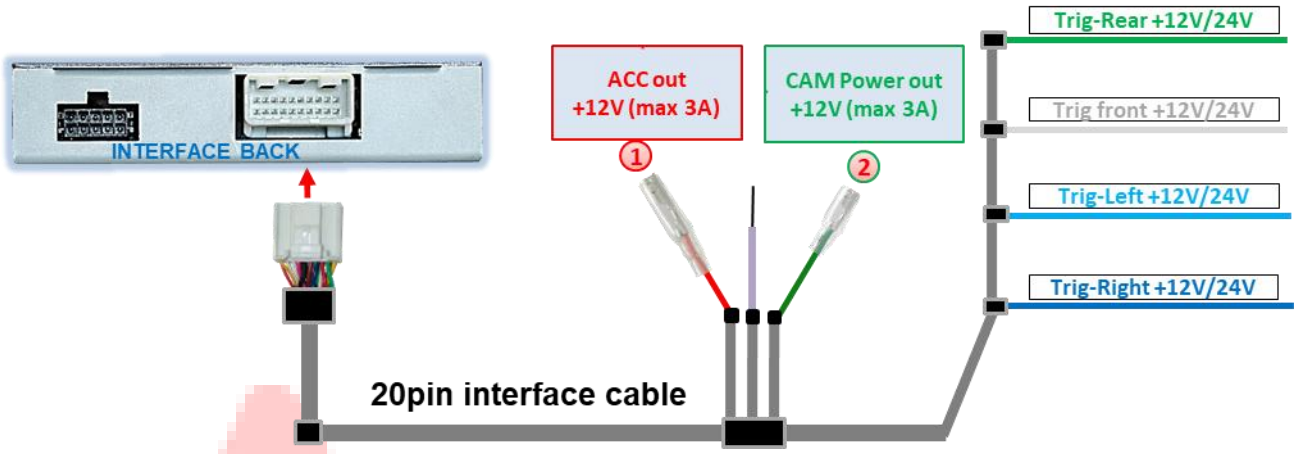
The pin assignment of the locking male connectors is shown in the diagram below.



1. Cut off the PNP section of the 31pin PNP power/CAN cable, expose the CAN and power wires on the remaining 10-pin wiring harness and connect them to the factory harness as shown in the diagram above.
2. Connect the 10-pin female connector of the connected cables to the 10-pin male connector of the video interface.

2.5 Power supply outputs

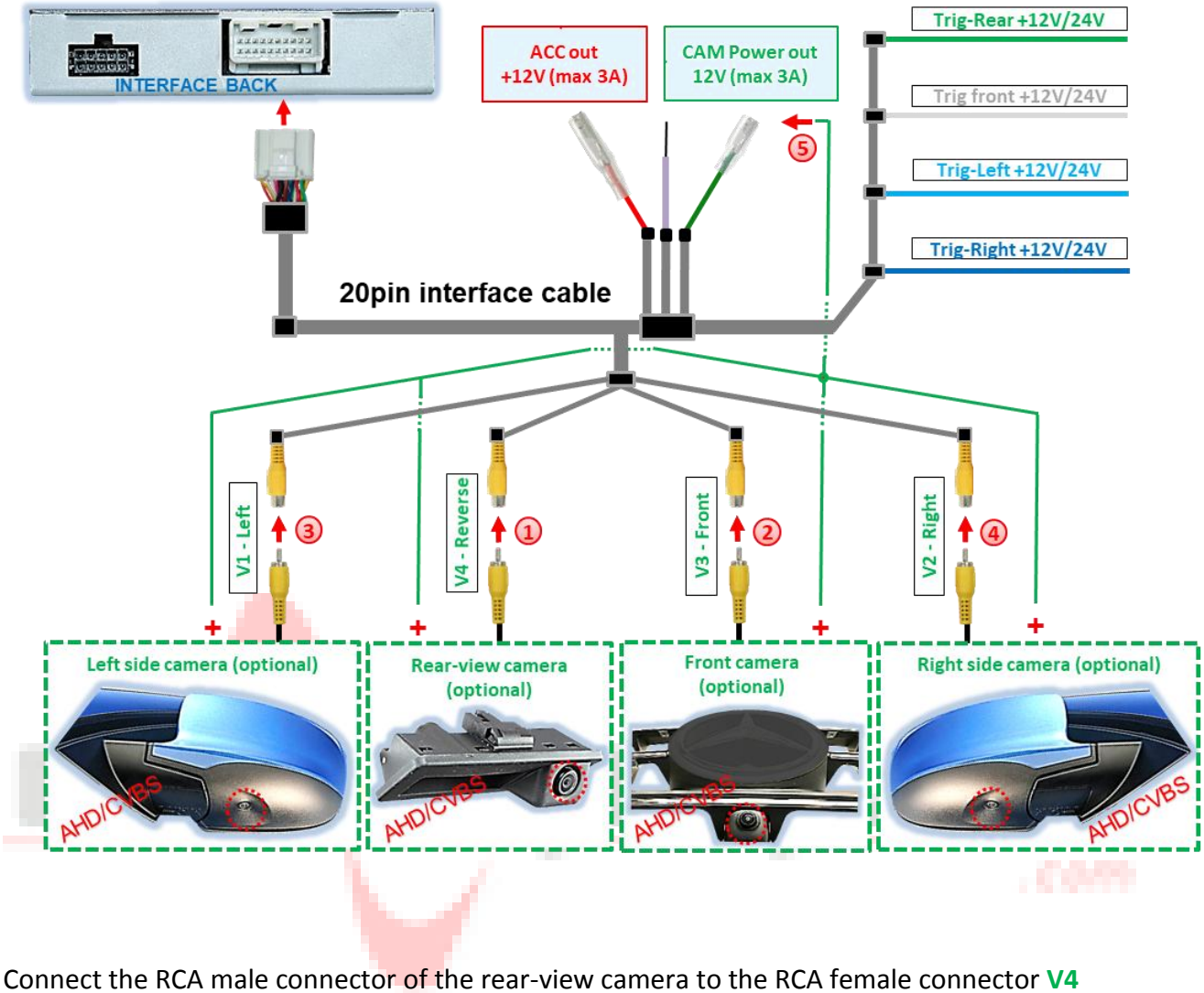
The two **red** and **green** power supply wires **ACC out 12V (max 3A)** and **CAM Power 12V (max 3A)** of the **20pin interface cable** can either be used as ACC power supply for the **external video sources** (e.g. iOS/Android devices, laptop, streaming stick, DVB-T2 tuner) connected to **V1-Left**, **V2-Right**, **V3-Front or HDMI** input * , or as power supply for the after-market cameras (e.g. side, front and rear view camera) connected to **V1-Left**, **V2-Right**, **V3-Front**, **V4-Reverse** or **HDMI** input* (e.g. side, front and rear-view cameras).



1. **External video sources** (no cameras) can be supplied with power via the red **ACC out 12V (max. 3A)** power supply wire of the **20pin interface cable**.
   The wire carries a **permanent** +12V ACC DC voltage as soon as the interface is switched on *(see the following chapter for connection diagrams)*.
2. The power supply for **after-market cameras** (e.g. reversing, side and front cameras) can be provided via the green power supply wire **CAM Power 12V (max 3A)** of the **20pin interface cable.** The wire carries **+12V DC voltage** only as long as one of the camera inputs is displayed, regardless of whether the connection is made via the vehicle CAN bus or via one of the trigger wires *(see the following chapter for connection diagrams)*.

*** HDMI input only available with HDV-MBMC**

2.5.1 Connection and power supply - Video sources
Rear-view camera, front camera and 2 side cameras

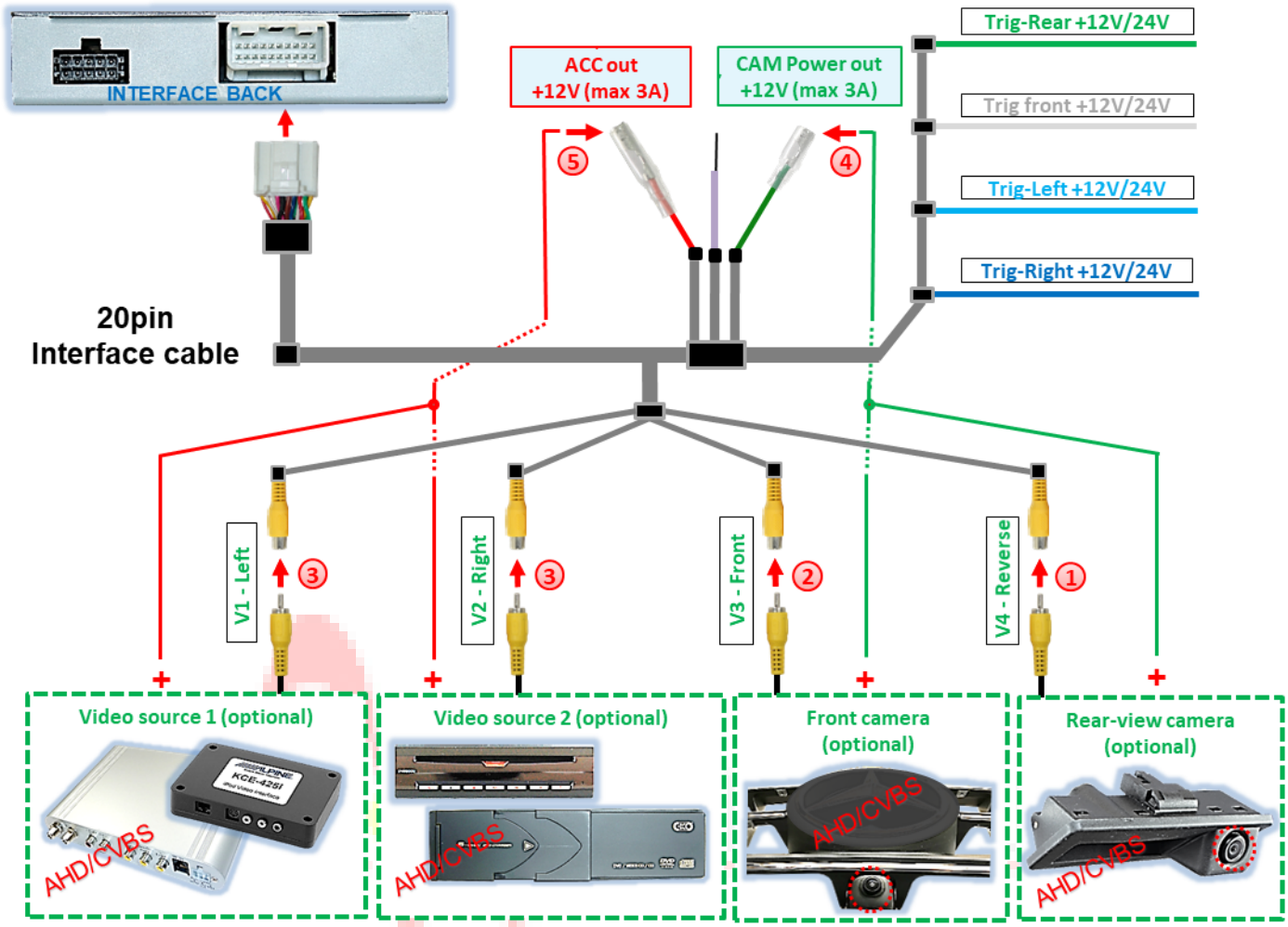


1. Connect the RCA male connector of the rear-view camera to the RCA female connector **V4 reverse** of the **20pin interface cable.**
2. Connect the RCA male connector of the front camera to the RCA female connector **V3 front** of the **20pin interface cable.**
3. Connect the RCA male connector of the left side camera to the RCA female connector **V1-Left** of the **20pin interface cable.**
4. Connect the RCA male connector of the right side camera to the RCA female connector **V2-Right** of the **20pin interface cable.**
5. Connect the power supply for all after-market cameras to the **green CAM Power 12V (max 3A) wire** of the **20pin interface cable.**

Note: The type of camera selection (via vehicle CAN bus or trigger wires) can be preset individually for each input in the OSD menu settings.

Attention!
Video signal type of each video source must be selected in the OSD menu of the corresponding video input, if Auto Detection has no function.

2.5.2 Connection and power supply - video sources



1 **Rear-view camera, front camera and 2 video sources**

Connect the RCA male connector of the rear-view camera to the RCA female connector V4-Reverse of the 20pin interface cable .

Connect the RCA male connector of the front camera to the RCA female connector V3-Front of the 20pin interface cable.

3 Connect the RCA male connectors of video sources 1 and 2 to the RCA female connectors V1-Left and V2-Right of the 20pin interface cable.

4 The power supply for after-market cameras on the **green CAM Power 12V cable (max 3A)** of the 20pin interface cable.

5 Connect the power supply for video sources to the **red cable ACC out 12V (max 3A)** of the 20pin interface cable.

Note: The type of camera selection (via vehicle CAN bus or trigger wires) can be preset **individually** for each input in the OSD menu settings.

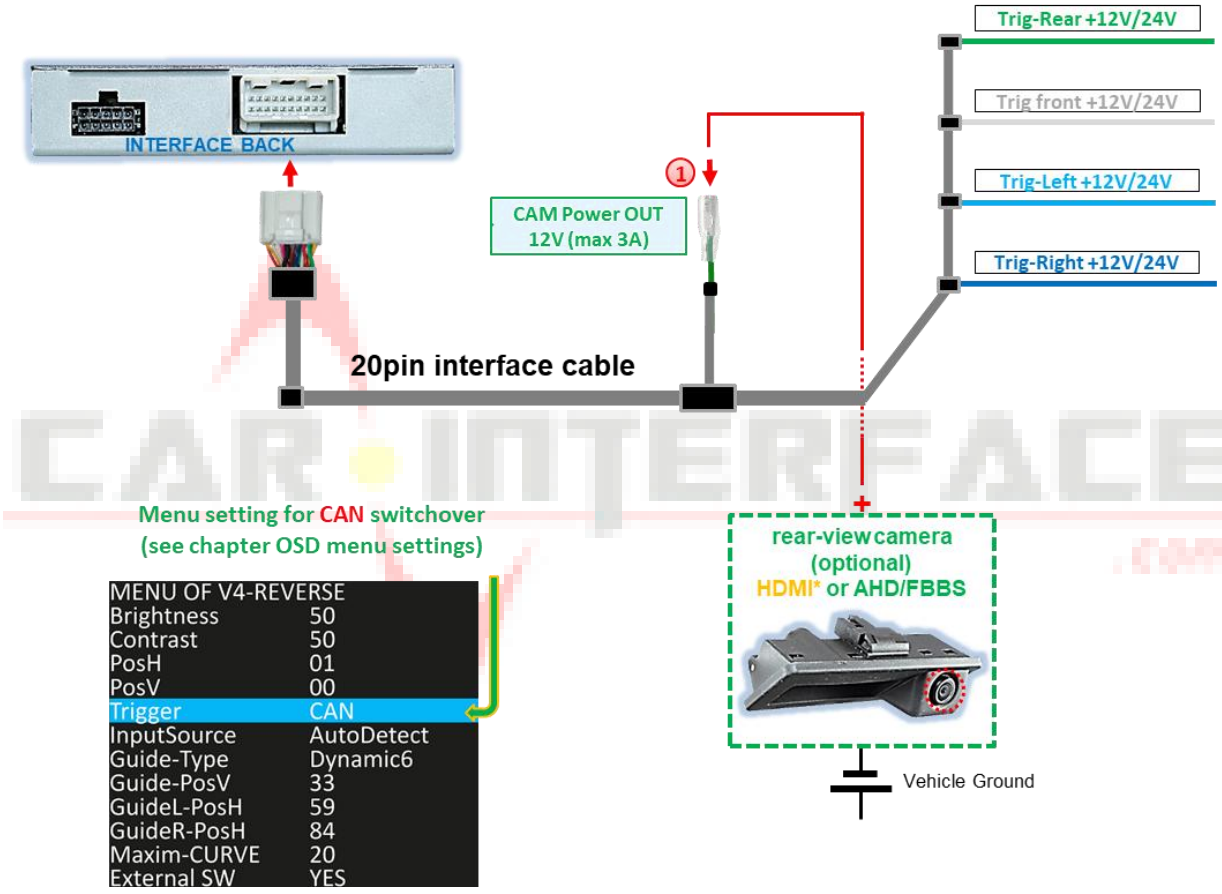
Attention!
Video signal type of each video source must be selected in the OSD menu of the corresponding video input, if Auto Detection has no function.

2.6 After-market rear-view camera

Automatic switching to rear-view camera can be carried out via the CAN bus or an analogue reverse gear signal.

2.6.1 Case 1: Reverse gear signal from CAN bus

The basic requirement is that the connection is made with CAN bus. Furthermore, the vehicle CAN bus reverse gear signal and detection by the interface must be compatible. Then the interface supplies +12V power supply while reverse gear is engaged on the **green wire CAM Power 12V (max 3A)** of the 20pin interface cable and the interface automatically switches to the rear-view camera input V4-Reverse or the HDMI- input *.
See also chapter 1.5 Settings – switch bench of 8 dip switches (interface functions).



1 The +12V power supply for the after-market rear-view camera can be provided via the **green cable CAM Power 12V (max 3A)** of the 20pin interface cable, as this cable only carries current while the camera inputs are switched on (some cameras are not suitable for continuous operation).

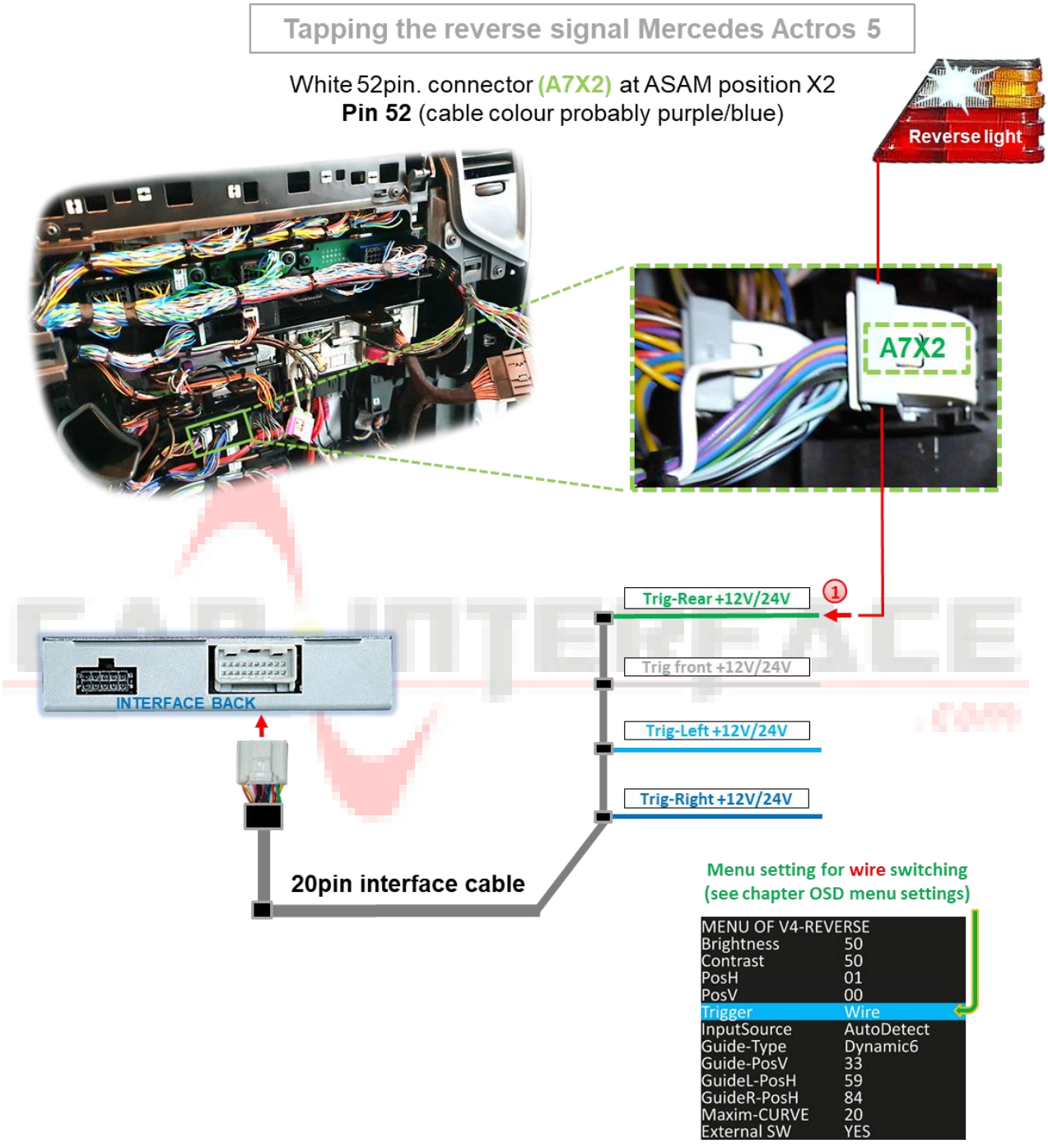
Notes

- If the HDMI input* is defined as the rear-view camera input, the **V4 reverse** input has no function!
- If the reverse gear detection of the interface on the CAN bus does not work , the reverse gear signal must be connected analogue.

*** HDMI input only available with HDV-MBMC**

2.6.2 Case 2: Reverse gear signal analogue connection

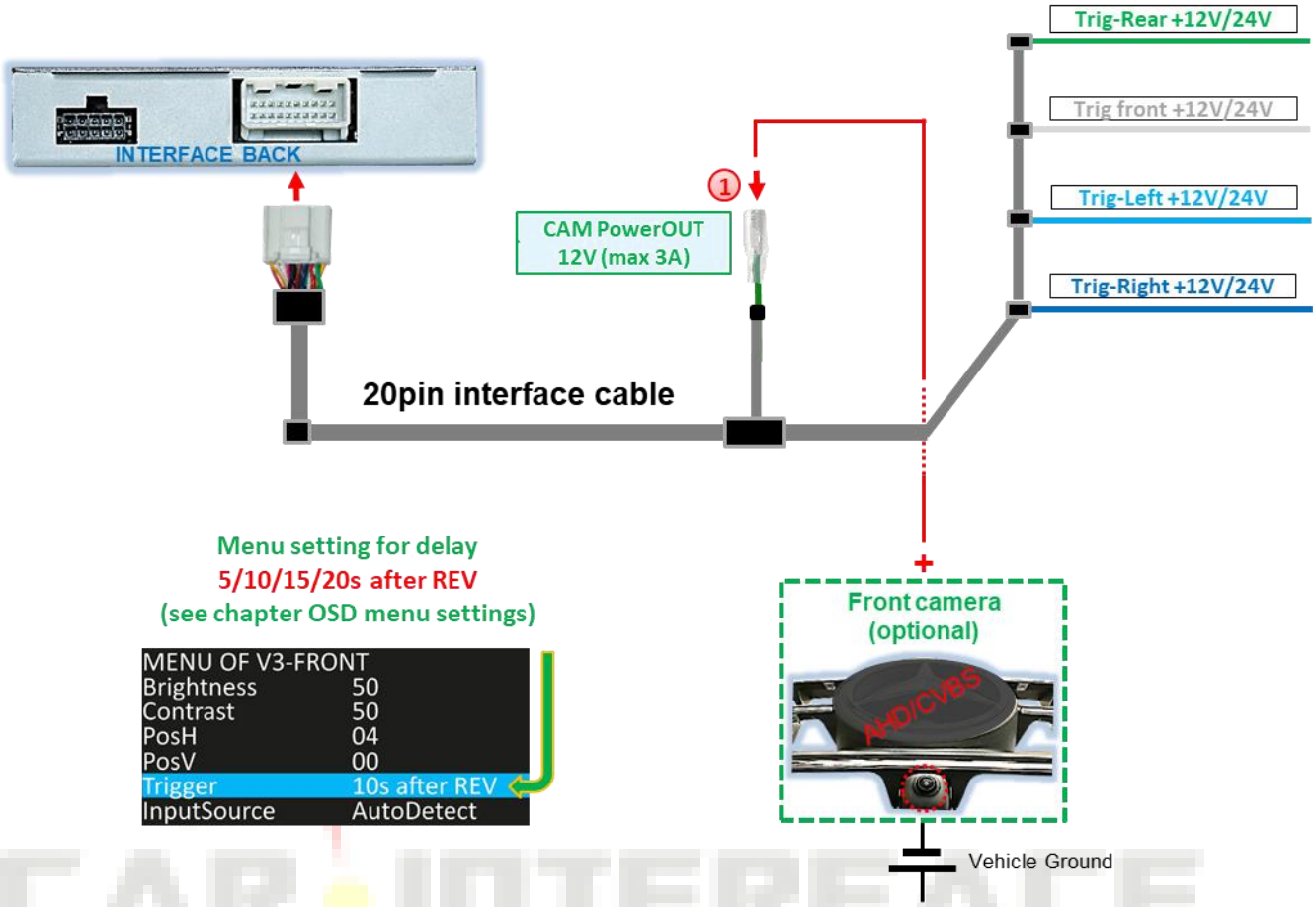
If the interface does not supply +12V on the **green CAM Power 12V wire (max 3A)** of the **20pin interface cable** when reverse gear is engaged (not all vehicles are compatible), an external +12V to +24V DC switching signal from the reversing light is required.



1 Connect the **green Trig-Rear wire** of the 20pin interface cable **"Reverse-signal input +12V - +24V "** to the corresponding pin with the vehicle's reverse signal

Note: The 52-pin connector A7X2 is located near the head unit for tapping the reversing signal. The 24V reversing signal is located on **pin 52** of the connector.

2.7 After-market front camera



1 The **green CAM Power 12V (max 3A) cable** can be used to supply power to the front camera (and all other cameras connected to the video inputs). This is only energised for the duration of any camera activation (some cameras are not suitable for continuous operation). The prerequisite is that dip 3 = **ON** (black switch bank of 8 dip switches). The delay time can be individually selected for **5**, **10**, **15** or **20** seconds in the OSD menu settings of the front camera.

Switchover to front camera after reverse gear has been engaged for the time set in the OSD menu takes place with reverse gear signal from CAN bus and with analogue connection.

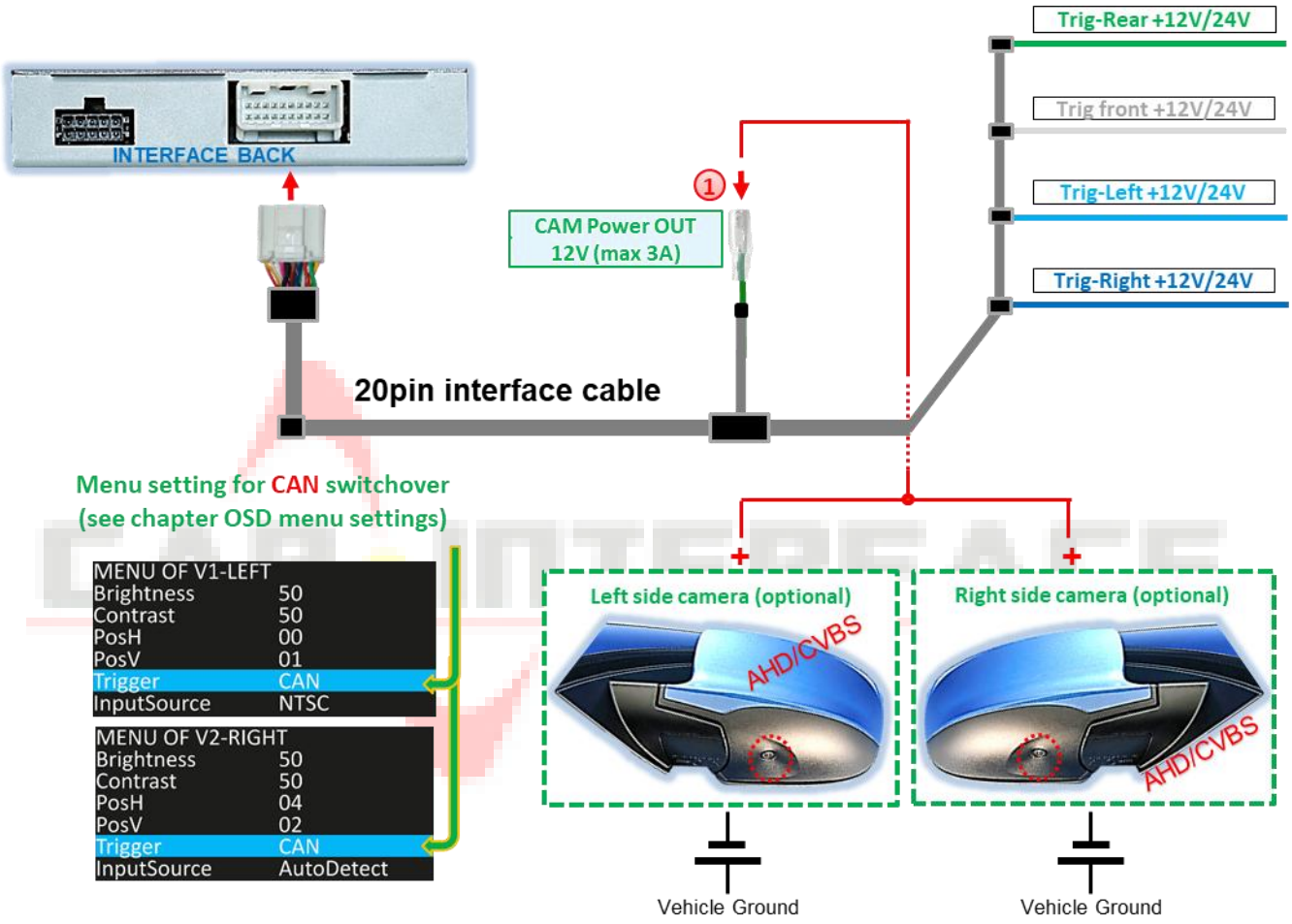
Note: In addition, manual switching to front camera input (short press) is possible from any picture mode using an external keypad *(see chapter 3 Operating the video interface)*.

2.8 After-market side cameras

Side cameras can be connected with selection via CAN bus or analogue.

2.8.1 Case 1: Turn signals from CAN bus

The basic requirement is that the connection is made with CAN bus. Furthermore, vehicle CAN bus turn signals and their recognition by the interface must be compatible. Then +12V is present on the **green CAM Power 12V wire (max 3A)** of the **20pin interface cable for the** duration of turn signal operations.



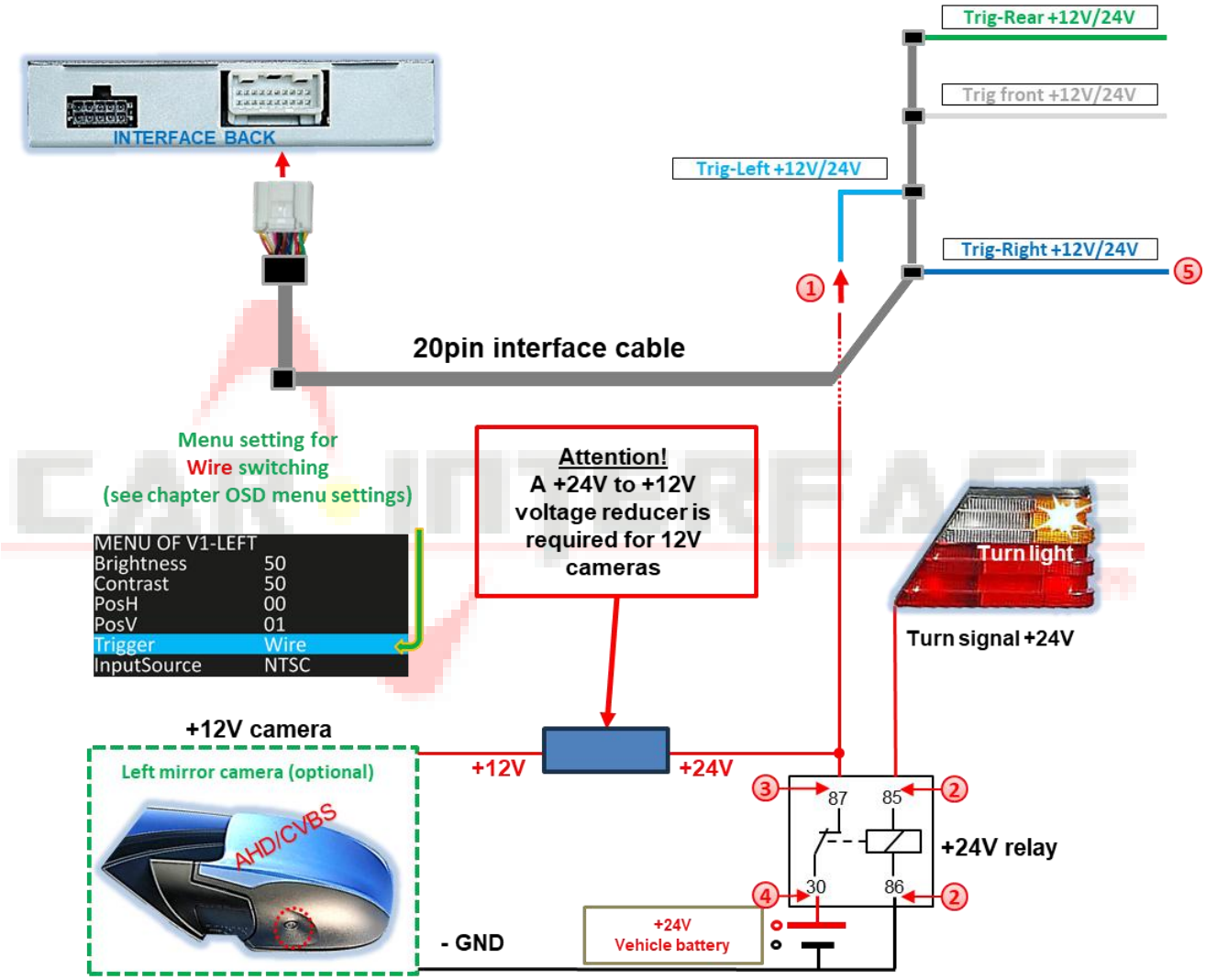
1 The power supply for the side cameras can be provided via the **green CAM Power 12V (max 3A)** of the **20pin interface cable**, as this wire only carries power during camera activations (some cameras are not continuously current-stable).

Note: If the turn signal detection of the interface on the vehicle CAN bus does not work, the turn signals must be connected in analogue form.

2.8.2 Case 2: Turn signals analogue connection

With an analogue connection, e.g. because signals from the vehicle CAN bus are not recognised, analogue activation of the side camera inputs is possible via the +12V/24V switching input wires **Trig-Left** and **Trig-Right.** An external switching signal from the turn signal bulbs is required to switch to the side camera inputs. As turn signals may contain electronic interference, a normally open relay or a noise filter is required for each input. The diagram below shows the use of a normally open relay

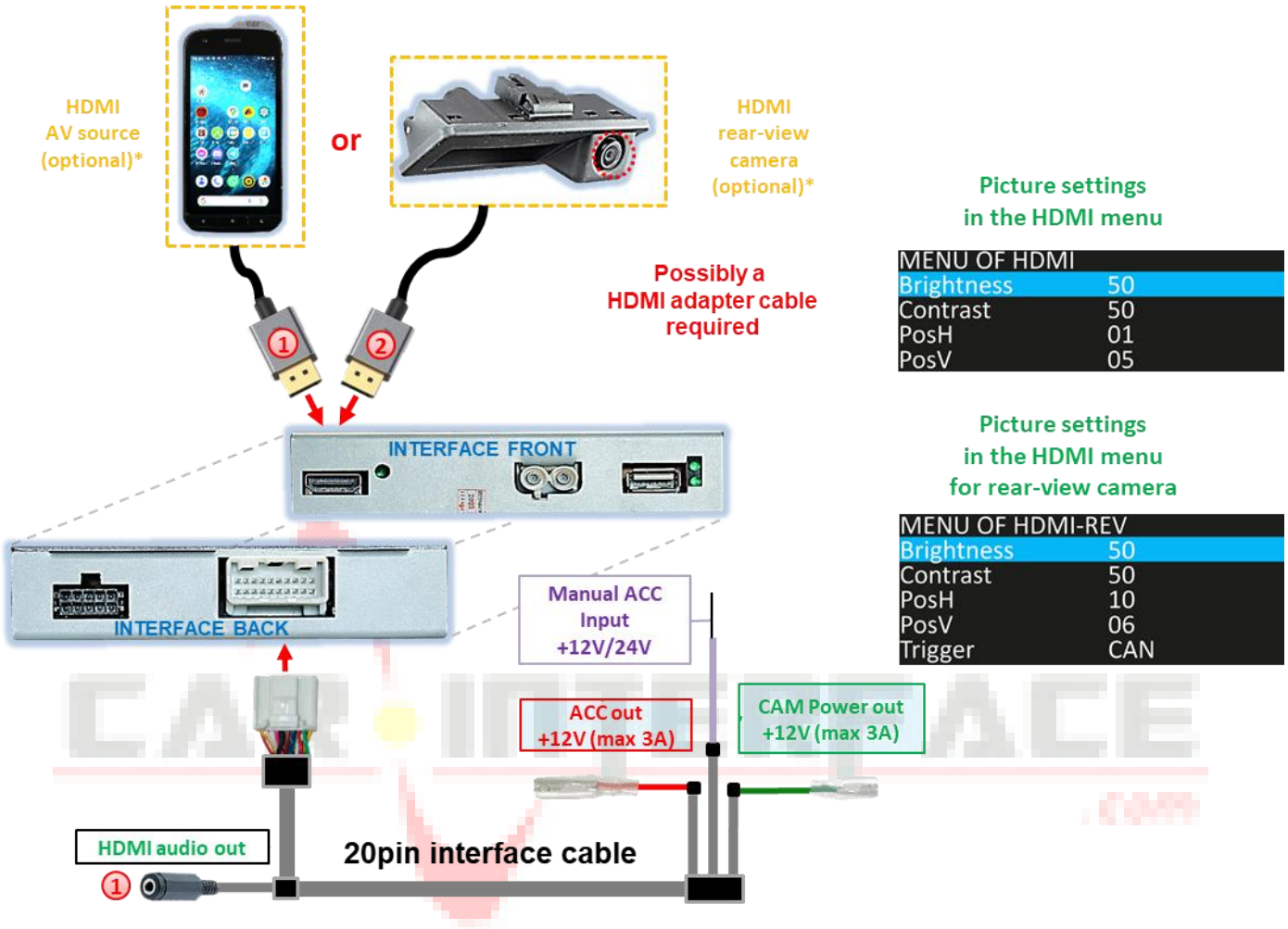
Note: When using +12V cameras, a +24V to +12V voltage reducer **must** also be installed, as shown in the diagram below.



1. Connect the **light blue cable Trig-Left** to the output terminal (87) of the relay.
2. Connect the flashing light power cable of the left-hand flashing light to the switching coil terminal (85) of the relay and the vehicle ground to the switching coil terminal (86) of the relay.
3. Connect the left side camera power cable to the output terminal (87) of the relay, in addition to the **light blue Trig-Left cable**.
4. Connect continuous current +24V to input terminal (30) of the relay.
5. The same connection method applies to the right side camera via the **dark blue Trig-Right cable.**

2.9 HDMI rear-view camera or other HDMI sources (HDV-MBMC only)

The HDMI input* of the interface can generally be used for any video source connected to it with an HDMI output (e.g. rear-view camera, 360° camera system or other video source such as smartphone, laptop, streaming stick DVB-T2 tuner, etc.).



1. If an optional HDMI video source is connected to the HDMI input*, the picture shown on the display of the source (e.g. smartphone, laptop, etc.) is mirrored on the vehicle monitor. Other sources (e.g. streaming stick, DVD player, DVB-T tuner, etc.) can also be displayed on the vehicle monitor. The video source can be supplied with power via the **red ACC out 12V(max3A) cable**. HDMI **audio signals** are output via the 3.5 mm jack female connector **HDMI audio** out * of the **20pin interface cable**. *See the following chapter 2.10 Audio* .

2. If a rear-view camera or a 360° camera system is connected to the HDMI input* (activated via CAN bus or analogue), the picture from the rear-view camera is displayed for the preset time when reverse gear is engaged and, after it has been laid out, the picture from a front camera connected to the front camera input **V3-Front is** also displayed. Power can be supplied via the **green cable CAM Power 12V(max3A)** .

*** HDMI input and HDMI audio out only available with HDV-MBMC**

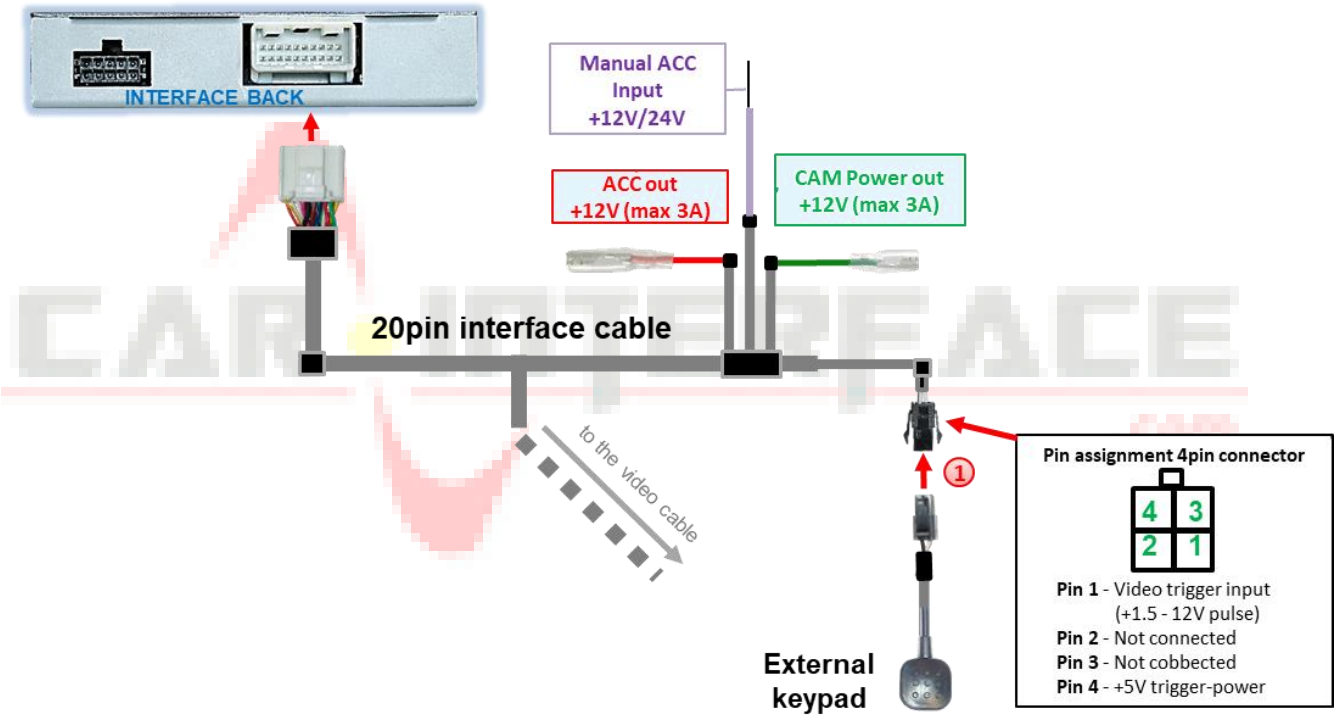
2.10 Audio insertion

The interface can only insert video signals into the factory infotainment.
Audio signals from the **HDMI input*** are output via the 3.5mm jack female connector **HDMI audio out*** of the interface. For all connected AV sources, their audio output must be connected to the factory AUX input (if available) or an optional audio feeder (e.g. AUX-UNI0x, FM modulator). If several AV sources are connected to the infotainment, an additional audio switch may be necessary.

Inserted Video signals can be activated in parallel to any audio mode of the factory infotainment system.

*** HDMI input and HDMI audio out only available with HDV-MBMC**

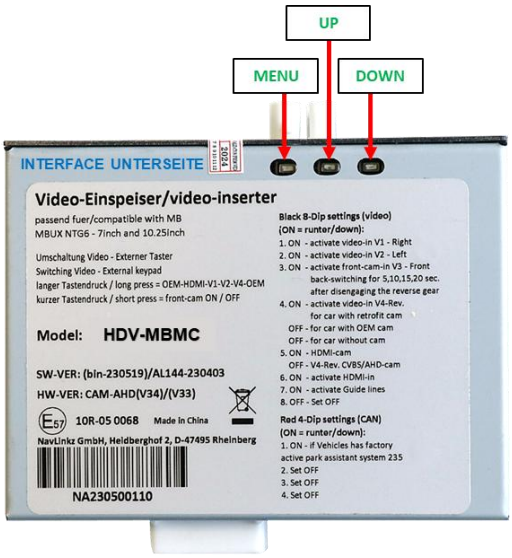
2.11 Connection - video interface and external keypad



1 Connect the 4-pin female connector of the external keypad to the 4-pin male connector of the **20pin interface cable.**

Note: Even if the keypad is not required for switching multiple sources, it is strongly recommended that it is connected to the interface and remains invisible. The keypad should then not be installed "pressed".

2.12 OSD menu settings



Attention!
Video signal type of each video source must be selected in the OSD menu of the corresponding video input, if Auto Detection has no function.

OSD menu settings can be changed using the 3 keypads on the back of the interface. MENU opens the OSD settings menu or moves the cursor to the next menu item. UP (UP) and DOWN (DOWN) change the values of the current menu item.

The individual OSD settings menu of each video input can only be called up while it is displayed, regardless of whether a video source is connected.

The following setting options are available in the OSD setting menus of the 5 video inputs:

Menu V1-Left (V2-Right)

Switch bench of 8 dip switches Dip 1 (Dip 2) = ON

MENU OF V1-LEFT	
Brightness	50
Contrast	50
PosH	00
PosV	01
Trigger	Wire
InputSource	NTSC

MENU OF V2-RIGHT	
Brightness	50
Contrast	50
PosH	04
PosV	02
Trigger	CAN
InputSource	AutoDetect

Brightness Brightness

Contrast Contrast

Item H Horizontal image position

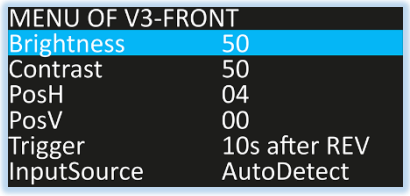
Item V Vertical image position

Trigger Type of selection of video input **V1-Left (V2-Right)**
"CAN" function for side cameras via CAN bus. Selection of the video input **V1-Left (V2-Right)** when activating the blink signal left (right). The prerequisite is that the blink signal is recognised by the interface on the vehicle CAN bus. Manual selection of this input using an external keypad does not work with this setting.
"Wire" function for other video sources or side cameras without CAN bus. The video input **V1-Left (V2-Right)** is selected exclusively via the **light blue** (**dark blue**) **Trig-Left** (**Trig-Right**) wire or manually via an external keypad.

Input Source Video signal type of the video source(s) connected to **V1-Left (V2-Right).**
AutoDetect - automatic setting of the video signal type (preset)
If the automatic setting of the video signal type does not work, it must be set manually. The following video source signal types can be selected:
CVBS video sources: **NTSC, PAL**
AHD video sources: **720p NTSC, 960p NTSC, 1080p NTSC, 720p PAL, 960p PAL, 1080p PAL**

Menu V3 front

Switch bench of 8 dip switches Dip 3 = ON



Brightness Brightness

Contrast Contrast

Item H Horizontal image position

Item V Vertical image position

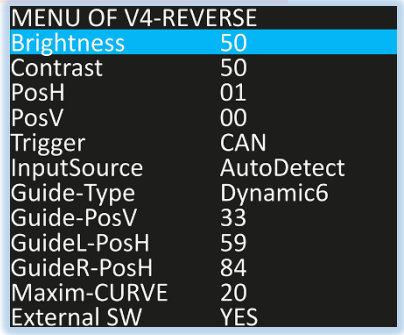
Trigger Type of selection of video input **V3 front**.
"Delay" function for front camera. The "**Delay"** setting is used to determine the automatic switching of a front camera connected to the V3 **front input** after reverse gear is engaged and its display duration on the display. Available are 5s after REV, 10s after REV, 15s after REV, 20s after REV.
"Wire" function for other video sources. If another video source is to be connected to **V3-Front** instead of a front camera, select the "Wire" setting. This switches off the "**Delay"** function and the input can only be selected via the white Trig-Front wire or manually via an external keypad.

Input Source Video signal type of the video source connected to the **V3 front**.
AutoDetect - automatic setting of the video signal type (preset)
If the automatic setting of the video signal type does not work, it must be set manually. The following video source signal types can be selected:
CVBS video sources: **NTSC, PAL**
AHD video sources: **720p NTSC, 960p NTSC, 1080p NTSC, 720p PAL, 960p PAL, 1080p PAL**

Menu V4 reverse

Switch bench of 8 dip switches Dip 4 = ON, Dip 5 = OFF, Dip 6 = OFF

V4-Reverse input has no function if **HDMI input*** is defined as rear-view camera input (Dip 5 = ON).



Brightness Brightness

Contrast Contrast

Item H Horizontal image position

Item V Vertical image position

Trigger Type of selection of rear-view camera input **V4 reverse**.
"CAN" function with CAN bus connection. With the "**CAN"** setting, the system automatically switches to **V4 reverse** for CVBS/AHD rear-view camera when reverse gear is engaged. The interface must recognise the reverse gear in the CAN bus.
"Wire" function with analogue connection. The selection of a rear-view camera connected to the **V4 reverse** via the **green Trig-Rear wire** is possible with both the "**Wire"** and **"CAN"** settings. It is recommended to set **"Wire"** for analogue (reversing signal) connection.

Input Source Video signal type of the video source connected to **V4 reverse.**
AutoDetect - automatic setting of the video signal type (preset)
If the automatic setting of the video signal type does not work, it must be set manually. The following video source signal types can be selected:
CVBS video sources: **NTSC, PAL**
AHD video sources: **720p NTSC, 960p NTSC, 1080p NTSC, 720p PAL, 960p PAL, 1080p PAL**

Guide Type	Setting 6 different angles of the guide lines for the rear-view camera	
	Moving guide lines	**Dynamic 1-6**
	Fixed guide lines	**Fixed 1-6**
	No guide lines	**OFF**
Guide Pos. V	Vertical position of the guide lines	**01-69**
Guide L Pos.H	Horizontal position of the left hand guide line	**01-90**
Guide R Pos.H	Horizontal position of the right-hand guide line	**01-90**
Maxim. Curve	Radius of the guide lines	**01-20**
External SW	Selectable via external keypad **V4 Reverse**	
	YES: *Factory video → HDMI* → V1-Left → V2-Right → V4-Reverse → Factory video*	
	NO: *Factory video → HDMI* → V1-Left → V2-Right → Factory video*	

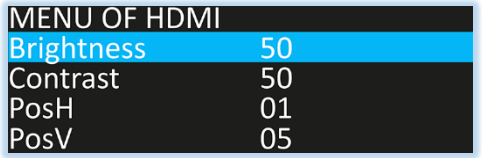
*** HDMI input only available with HDV-MBMC**

Menu HDMI*

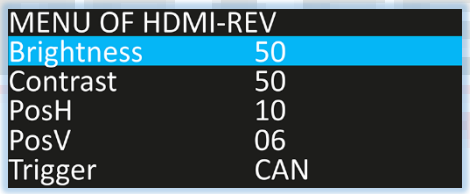
Switch bench of 8 dip switches (dip 4 = ON, dip 5 = **ON/OFF**, dip 6 = ON)

HDMI AV input (Dip 5 – OFF)

Brightness	Brightness
Contrast	Contrast
Item H	Horizontal image position
Item V	Vertical image position



HDMI rear-view camera input (Dip 5 = ON)



Brightness	Brightness
Contrast	Contrast
Pos. H	Horizontal image position
Pos. V	Vertical image position
Trigger	Type of selection of rear-view camera input **HDMI-REV**. **"CAN" function with CAN bus connection**. With the "**CAN**" setting, the system automatically switches to **HDMI*** for HDMI rear-view camera when reverse gear is engaged. The interface must recognise the reverse gear in the CAN bus. **"Wire" function with analogue connection**. The selection of a rear-view camera connected to the **HDMI*** via the **green Trig-Rear wire** is possible with both the "**Wire**" and **"CAN"** settings. It is recommended to set **"Wire"** for analogue (reversing signal) connection.

In the **HDMI** menu*, the picture settings of an HDMI rear-view camera connected to the **HDMI input*** (Dip 5 = **ON**) or another connected HDMI AV source can be made (Dip 5 = OFF).
(Dip 5 = **OFF**) can be made when these are displayed.

The picture resolution of connected HDMI sources is recognised automatically.

Notes: **V4-Reverse** input has no function if the **HDMI input*** is defined as a rear-view camera input (dip 5 = **ON**).

*** HDMI input only available with HDV-MBMC**

3 Operating the video interface

The external keypad can be used to switch all activated inputs - except the input defined as the rear-view camera input.

- Long press of the keypad (2-3 seconds)

The external keypad switches from factory video to the first activated interface video input with a long press (2-3 seconds). Each further long press switches an activated interface video input until the last press switches back to factory video. Deactivated inputs are skipped. If all inputs are activated using the corresponding dip switch, the sequence is as follows:

Factory video → ***HDMI**** → ***V1-Left*** → ***V2-Right*** → ***V4-Reverse**** → *Factory video*

Note: The interface only switches after the switch is released (after a long press).

*** HDMI input only available with HDV-MBMC**

V4-Reverse can only be selected via the external keypad if the "External SW" function is set to "Yes" in the **V4-Reverse** menu.

- Briefly press the keypad (only possible if dip 3 is ON)

The external keypad switches from the current video mode to the front camera input when pressed briefly.
input V3-Front and back to the previous video mode when pressed briefly again .

Note: Even if the keypad is not required for switching multiple sources, it is strongly recommended that it is connected to the interface and remains invisible.
The keypad should then not be installed "pressed".

4 Specifications

BATT/ACC range	9V - 16V
Stand-by power drain	approx. 4.5mA
Power consumption	270mA @12V
Video input	0.7V - 1V
Video input signal types	CVBS/AHD/HDMI **(HDV version only)**
Signal standards CVBS/AHD	NTSC/PAL
Temperature range	-40°C to +85°C
Video box dimensions	117 x 25 x 109 mm (W x H x D)

5 FAQ - Troubleshooting Interface functions - product-specific

Problem	Possible cause	Solution
Malfunction or no picture	Video input signal type for video source: AutoDetection without function or manual setting in the OSD of the respective video input not correctly defined	See chapter *2.12 OSD menu settings* - Menu of the respective input

6 FAQ - Troubleshooting Interface functions - general

For any troubles which may occur, check the following table for a solution before requesting support from your vendor.

Symptom	Reason	Possible solution
No picture/black picture (factory picture).	Not all connectors have been reconnected to factory head-unit or monitor after installation.	Connect missing connectors.
	No power on CAN-bus box (all LED CAN-bus box are off).	Check power supply of CAN-bus box. Check CAN-bus connection of CAN-bus box.
	CAN-bus box connected to CAN-bus in wrong place.	Refer to the manual where to connect to the CAN-bus. If not mentioned, try another place to connect to the CAN-bus.
	No power on video-interface (all LED video-interface are off).	Check whether CAN-bus box delivers +12V ACC on red wire output of 8pin to 6pin cable. If not cut wire and supply ACC +12V directly to video-interface.
No picture/black picture/white picture (inserted picture) but factory picture is OK.	No picture from video source.	Check on other monitor whether video source is OK.
	No video-source connected to the selected interface input.	Check settings dips 1 to 3 of video interface which inputs are activated and switch to corresponding input(s).
	LVDS cables plugged in wrong place.	Double-check whether order of LVDS cables is exactly connected according to manual. Plugging into head-unit does not work when the manual says to plug into monitor and vice versa.
Inserted picture totally wrong size or position.	Wrong monitor settings of video-interface.	Try different combinations of dips 7 and 8 of video-interface. Unplug 6pin power after each change.
Inserted picture double or 4 times on monitor.		
Inserted picture distorted, flickering or running vertically.	Video sources output set to AUTO or MULTI which causes a conflict with the interfaces auto detection.	Set video source output fixed to PAL or NTSC. It is best to set all video sources to the same standard.
	If error occurs only after source switching: Connected sources are not set to the same TV standard.	Set all video sources to the same standard.
	Some interfaces can only handle NTSC input.	Check manual whether there is a limitation to NTSC mentioned. If yes, set source fixed to NTSC output.
Inserted picture b/w.		
Inserted picture qual. bad.	Picture settings have not been adjusted.	Use the 3 buttons and the interface's OSD to adjust the picture settings for the corresponding video input.
Inserted picture size slightly wrong.		
Inserted picture position wrong.		
Camera input picture flickers.	Camera is being tested under fluorescent light which shines directly into the camera.	Test camera under natural light outside the garage.
Camera input picture is bluish.	Protection sticker not removed from camera lens.	Remove protection sticker from lens.

Symptom	Reason	Possible solution
Camera input picture black.	Camera power taken directly from reverse gear lamp.	Use relay or electronics to "clean" reverse gear lamp power. Alternatively, if CAN-bus box is compatible with the vehicle, camera power can be taken from green wire of 6pin to 8pin cable.
Camera input picture has distortion.		
Camera input picture settings cannot be adjusted.	Camera input picture settings can only be adjusted in AV2 mode.	Set dip 3 of video-interface to ON (if not input AV2 is not already activated) and connect the camera to AV2. Switch to AV2 and adjust settings. Reconnect camera to camera input and deactivate AV2 if not used for other source.
Graphics of a car in camera input picture.	Function PDC is ON in the interface OSD.	In compatible vehicles, the graphics will display the factory PDC distance. If not working or not wanted, set interface OSD menu item UI-CNTRL to ALLOFF.
Chinese signs in camera input picture	Function RET or ALL is ON (function for Asian market) in the interface OSD.	Set interface OSD menu item UI-CNTRL to ALLOFF or PDCON.
Not possible to switch video sources by OEM button.	CAN-bus interface does not support this function for vehicle.	Use external keypad or cut white wire of 6pin to 8pin cable and apply +12V impulses for AV-switching.
	Pressed too short.	For video source switching a longer press of about 2.5 seconds is required.
Not possible to switch video sources by external keypad.	SW-version of interface does not support external keypad.	Use OEM-button or cut white wire of 6pin to 8pin cable and apply +12V impulses for AV-switching.
Interface does not switch to camera input when reverse gear is engaged.	CAN-bus interface does not support this function for the vehicles.	Cut the green wire of the 6pin to 8pin cable and apply +12V constant from reverse gear-lamp signal. Use relay to "clean" R-gear lamp power.
Interface switches video-sources by itself.	CAN-bus interface compatibility to vehicle is limited.	Cut the grey wire of 6pin to 8pin and isolate both ends. If problem still occurs, additionally cut the white wire of 6pin to 8pin cable and isolate both ends.

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