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Accessories for Network Interfaces

CAN/LIN/IO/Ethernet/FlexRay

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1 Introduction

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1.1 About this User Manual

Conventions

In the two following charts you will find the conventions used in the user manual regarding utilized spellings and symbols.

Style	Utilization
bold	Blocks, surface elements, window and dialog names of the software. Accentuation of warnings and advices. **[OK]** Push buttons in brackets **File|Save** Notation for menus and menu entries
`Source Code`	File name and source code.
Hyperlink	Hyperlinks and references.
<CTRL>+<S>	Notation for shortcuts.

Symbol	Utilization
	This symbol calls your attention to warnings.
	Here you can obtain supplemental information.
	Here you can find additional information.
	Here is an example that has been prepared for you.
	Step-by-step instructions provide assistance at these points.
	Instructions on editing files are found at these points.
	This symbol warns you not to edit the specified file.

1.1.1 Warranty

Restriction of warranty

We reserve the right to modify the contents of the documentation or the software without notice. Vector disclaims all liabilities for the completeness or correctness of the contents and for damage which may result from the use of this documentation.

1.1.2 Registered Trademarks

Registered trademarks

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> Windows, Windows 7, Windows 8.1, Windows 10, Windows 11 are trademarks of the Microsoft Corporation.

1.2 Important Notes



WARNING!

We provide our important notes and safety instructions in several languages, including Englisch (EN) and German (DE). For more details, see the relevant section:

- EN: Important Notes - Details
- DE: Wichtige Hinweise

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2.1 Accessories for VN0601

Cables and connectors

- VNcable DSUB37 (page 174)
- Terminal Block DSUB37 (page 179)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox internal (page 203)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 2.0 (page 151)

2.2 Accessories for VN1150

Bus transceiver

- CAN-/LINpiggies (see section Compatibility on page 45)
- SENSORpiggies (see section Compatibility on page 45)

Cables and connectors

- CANcable0 (page 104)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- CANcable Y (page 109)
- CANcable 2Y (page 110)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)

2.3 VN1500 Interface Family

2.3.1 Accessories for VN1530

Bus transceiver
- CAN-/LINpiggies (see section Compatibility on page 45)

Cables and connectors
- VNcable 3Y (page 175)
- CANterm 120 (page 112)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox internal (page 203)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)

2.3.2 Accessories for VN1531

Bus transceiver
- CAN-/LINpiggies (see section Compatibility on page 45)

Cables and connectors
- VNcable 3Y (page 175)
- CANterm 120 (page 112)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
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- Cable Binder 3pol Connector with Pigtail (page 163)

2.4 VN1600 Interface Family

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Cables and connectors

- CANcable0 (page 104)
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- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- USBadapter 3.2 Gen 1 C-A SDSL (Single Screw Lock) (page 160)

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Cables and connectors

- CANcable0 (page 104)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable Y (page 109)
- CANcable 2Y (page 110)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- USBadapter 3.2 Gen 1 C-A SDSL (Single Screw Lock) (page 160)

2.4.3 Accessories for VN1630A

Bus transceiver

- CAN-/LINpiggies (see section Compatibility on page 45)
- J1708 Piggyback (see section Compatibility on page 45)

Cables and connectors

- CANcable0 (page 104)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- CANcable Y (page 109)
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- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)

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> Cable Binder 3pol Connector with Pigtail (page 163)
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Miscellaneous
> Fix Kit 32mm Device (page 219)
> USB Protector Type 1 (page 226)

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> CAN-/LINpiggies (see section Compatibility on page 45)
> J1708 Piggyback (see section Compatibility on page 45)
> SENT Piggyback (see section Compatibility on page 45)

Cables and connectors
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> CANcable1 (page 105)
> CANcableA (page 106)
> CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
> CANcable Y (page 109)
> CANterm 120 (page 112)
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> Vector SYNCcableXL (page 199)
> Vector SYNCcable50 (page 200)
> Multi SYNCbox external (page 201)
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> Cable Binder 3pol Connector with Pigtail (page 163)
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Miscellaneous
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> USB Protector Type 1 (page 226)

2.4.5 Accessories for VN1630 log

Bus transceiver
> CAN-/LINpiggies (see section Compatibility on page 45)

Cables and connectors
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> CANcable1 (page 105)
> CANcableA (page 106)
> CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
> CANcable TnT Term (page 108)
> CANcable Y (page 109)
> CANcable 2Y (page 110)

- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 2.0 (page 151)

Power supply

- Vector Power Supply 12V/1.5A (page 182)
- Cable Banana Plug <> Binder 3-pin (page 191)
- Car Power Supply Cable 12V with Binder (page 189)

Miscellaneous

- Fix Kit 32mm Device (page 219)
- SD/SDHC Memory Cards (page 224)

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Bus transceiver

- CANpiggies (see section Compatibility on page 45)
- SENSORpiggies (see section Compatibility on page 45)

Cables and connectors

- CANcable0 (page 104)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- CANcable Y (page 109)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
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Power supply

- Power Supply USB-C Basic (page 188)

Miscellaneous

- Fix Kit 42mm Device (page 220)

2.4.7 Accessories for VN1670

Bus transceiver

- CAN-/LINpiggies (see section Compatibility on page 45)
- SENSORpiggies (see section Compatibility on page 45)

Cables and connectors

- VNcable 3Y (page 175)
- CANterm 120 (page 112)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
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- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 3.1 Type C-C (Dual Screw Lock) (page 156)
- Ethernet cables (page 135)

Power supply

- Vector Power Supply ODU Mini-Snap (page 183)
- Cable Vehicle Input <> ODU Mini-Snap (page 190)
- Cable Banana Plug <> ODU Mini-Snap (page 192)

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- VSH Connecting Kit Horizontal (page 215)
- VSH Connecting Kit Vertical (page 216)
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Cables and connectors

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- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable Y (page 109)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
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- USB Cable 2.0 (page 151)

Power supply

- Vector Power Supply 12V/1.5A (page 182)
- Cable Banana Plug <> Binder 3-pin (page 191)
- Car Power Supply Cable 12V with Binder (page 189)

Miscellaneous

- Fix Kit 42mm Device (page 220)
- 5.9 GHz DSRC Antenna SMA (page 223)
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- > Vector SYNCcableXL (page 199)
- > Vector SYNCcable50 (page 200)
- > Multi SYNCbox external (page 201)
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- > Ethernet cables (page 135)

Power supply
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Cables and connectors
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- > Vector SYNCcableXL (page 199)
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- > Ethernet cables (page 135)

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Power supply

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- Cable Banana Plug <> Binder 3-pin (page 191)
- Car Power Supply Cable 12V with Binder (page 189)

Miscellaneous

- Fix Kit 32mm Device (page 219)

2.6.8 Accessories for VN5631

Cables and connectors

- AEcable 2Y (page 114)
- AEcable 2Y DSUB9 10BASE-T1S (page 128)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- CANcable Y (page 109)
- CANcable 2Y (page 110)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)

- Multi SYNCbox internal (page 203)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 3.1 Type A-C (Dual Screw Lock) (page 155)
- USB Cable 3.1 Type C-C (Dual Screw Lock) (page 156)
- Ethernet cables (page 135)

Power supply

- Vector Power Supply ODU Mini-Snap (page 183)
- Cable Vehicle Input <> ODU Mini-Snap (page 190)
- Cable Banana Plug <> ODU Mini-Snap (page 192)

2.6.9 Accessories for VN5632

Cables and connectors

- AEcable 2Y (page 114)
- AEcable MultiGig Family (page 121)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox internal (page 203)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 3.1 Type A-C (Dual Screw Lock) (page 155)
- USB Cable 3.1 Type C-C (Dual Screw Lock) (page 156)
- Ethernet cables (page 135)

Power supply

- Vector Power Supply ODU Mini-Snap (page 183)
- Cable Vehicle Input <> ODU Mini-Snap (page 190)
- Cable Banana Plug <> ODU Mini-Snap (page 192)

2.6.10 Accessories for VN5640 Option 1000BASE-T1

Cables and connectors

- AEcable 2Y (page 114)
- BRcable 2Y (page 132)
- VNcable D-SUB9 HSD Z (page 133)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- CANcable Y (page 109)
- CANcable 2Y (page 110)

- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox internal (page 203)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 3.0 (page 151)
- Ethernet cables (page 135)

Power supply

- Vector Power Supply ODU Mini-Snap (page 183)
- Cable Vehicle Input <> ODU Mini-Snap (page 190)
- Cable Banana Plug <> ODU Mini-Snap (page 192)

Miscellaneous

- Fix Kit Large Device (page 221)

2.6.11 Accessories for VN5640

Cables and connectors

- AEcable 2Y (page 114)
- BRcable 2Y (page 132)
- VNcable D-SUB9 HSD Z (page 133)
- CANcable Y (page 109)
- CANcable 2Y (page 110)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox internal (page 203)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 3.0 (page 151)
- Ethernet cables (page 135)

Power supply

- Vector Power Supply ODU Mini-Snap (page 183)
- Cable Vehicle Input <> ODU Mini-Snap (page 190)
- Cable Banana Plug <> ODU Mini-Snap (page 192)

Miscellaneous

- Fix Kit Large Device (page 221)

2.6.12 Accessories for VN5650

Cables and connectors

> AEcable 2Y (page 114)
> CANcable0 (page 104)
> CANcable1 (page 105)
> CANcableA (page 106)
> CANcable Y (page 109)
> CANcable 2Y (page 110)
> CANterm 120 (page 112)
> CANcable Set Pro (page 113)
> Vector SYNCcableXL (page 199)
> Vector SYNCcable50 (page 200)
> Multi SYNCbox external (page 201)
> Multi SYNCbox internal (page 203)
> Multi SYNCbox active (page 205)
> Cable Binder 3pol Connector with Pigtail (page 163)
> USB Cable 3.1 Type A-C (Dual Screw Lock) (page 155)
> USB Cable 3.1 Type C-C (Dual Screw Lock) (page 156)
> Ethernet cables (page 135)

Power supply

> Vector Power Supply ODU Mini-Snap (page 183)
> Cable Banana Plug <> ODU Mini-Snap (page 192)

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> VSH Cable Guard 216 (page 208)
> VSH Cable Guard 216 Clip (page 212)
> VSH Connecting Kit 19" (page 213)
> VSH Connecting Kit Horizontal (page 215)
> VSH Connecting Kit Vertical (page 216)
> VSH Equipment Foot Kit (page 217)
> VSH Mounting Flange (page 218)

2.7 Accessories for VN7572

Bus transceiver

- FRpiggies (see section Compatibility on page 45)
- CAN-/LINpiggies (see section Compatibility on page 45)
- IOpiggy 8642 (see section Compatibility on page 45)

Cables and connectors

- Breakout Box D62Y9 (page 166)
- VNcable DSUB62 for Breakout Box (page 168)
- VNcable DSUB62 A (page 169)
- VNcable DSUB62 B (page 170)
- VNcable D62Y9 (page 172)
- FRcable A (page 141)
- FRcable AB (page 142)
- FRterm (page 143)
- FRcable Set (page 141)
- CANcable0 (page 104)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- CANcable TnT Term (page 108)
- CANcable Y (page 109)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox internal (page 203)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)

2.8 VN7600 Interface Family

2.8.1 Accessories for VN7610

Cables and connectors

- FR/CANcable 2Y (page 144)
- FRcable A (page 141)
- FRcable AB (page 142)
- FRterm (page 143)
- FRcable Set (page 141)
- CANcable0 (page 104)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- CANcable Y (page 109)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- USBadapter 3.2 Gen 1 C-A SDSL (Single Screw Lock) (page 160)

2.8.2 Accessories for VN7640

Bus transceiver

- FRpiggies (see section Compatibility on page 45)
- CAN-/LINpiggies (see section Compatibility on page 45)

Cables and connectors

- FRcable A (page 141)
- FRcable AB (page 142)
- FRterm (page 143)
- FRcable Set (page 141)
- CANcable0 (page 104)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable Y (page 109)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)
- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox internal (page 203)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 2.0 (page 151)

	> Ethernet cables (page 135)
Power supply	> Vector Power Supply 12V/1.5A (page 182)
	> Cable Banana Plug <> Binder 3-pin (page 191)
Miscellaneous	> Fix Kit 42mm Device (page 220)

2.9 VN8900 Interface Family

2.9.1 Accessories for VN8911

Cables and connectors

- Vector SYNCcableXL (page 199)
- Vector SYNCcable50 (page 200)
- Multi SYNCbox external (page 201)
- Multi SYNCbox active (page 205)
- Cable Binder 3pol Connector with Pigtail (page 163)
- USB Cable 3.0 (page 151)
- Ethernet cables (page 135)

Power supply

- Vector Power Supply ODU Mini-Snap (page 183)
- Car Power Supply Cable 12V with Binder (page 189)
- Cable Vehicle Input <> ODU Mini-Snap (page 190)
- Cable Banana Plug <> ODU Mini-Snap (page 192)

Miscellaneous

- Fix Kit Large Device (page 221)
- SD/SDHC/SDXC Memory Cards (page 224)
- Front Panel for VN8900 (page 227)
- CFast Card Reader USB 3.0 (external) (page 225)

2.9.2 Accessories for VN8917

Cables and connectors

- > Vector SYNCcableXL (page 199)
- > Vector SYNCcable50 (page 200)
- > Multi SYNCbox external (page 201)
- > Multi SYNCbox active (page 205)
- > Cable Binder 3pol Connector with Pigtail (page 163)
- > USB Cable 3.0 (page 151)
- > USB Cable 3.0 (Type-B Conn. with Screws) (page 154)
- > Ethernet cables (page 135)

Power supply

- > Vector Power Supply ODU Mini-Snap (page 183)
- > Car Power Supply Cable 12V with Binder (page 189)
- > Cable Vehicle Input <> ODU Mini-Snap (page 190)
- > Cable Banana Plug <> ODU Mini-Snap (page 192)

Miscellaneous

- > Fix Kit Large Device (page 221)
- > SD/SDHC/SDXC Memory Cards (page 224)
- > Front Panel for VN8900 (page 227)

2.9.3 Accessories for VN8970

Bus transceiver

- > FRpiggies (see section Compatibility on page 45)
- > CAN-/LINpiggies (see section Compatibility on page 45)
- > IOpiggy 8642 (see section Compatibility on page 45)

Cables and connectors

- > FRcable A (page 141)
- > FRcable AB (page 142)
- > FRterm (page 143)
- > FRcable Set (page 141)
- > CANcable0 (page 104)
- > CANcable1 (page 105)
- > CANcableA (page 106)
- > CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- > CANcable TnT Term (page 108)
- > CANcable Y (page 109)
- > CANcable 2Y (page 110)
- > CANterm 120 (page 112)
- > CANcable Set Pro (page 113)

2.9.4 Accessories for VN8972

Bus transceiver

- FRpiggies (see section Compatibility on page 45)
- CAN-/LINpiggies (see section Compatibility on page 45)
- IOpiggy 8642 (see section Compatibility on page 45)

Cables and connectors

- FRcable A (page 141)
- FRcable AB (page 142)
- FRterm (page 143)
- FRcable Set (page 141)
- CANcable0 (page 104)
- CANcable1 (page 105)
- CANcableA (page 106)
- CANcable TnT (D-SUB9 to Bunch Plugs) (page 107)
- CANcable TnT Term (page 108)
- CANcable Y (page 109)
- CANcable 2Y (page 110)
- CANterm 120 (page 112)
- CANcable Set Pro (page 113)

3 Transceiver - Products

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3.1 Piggybacks

Properties

A piggyback implements the interconnection of the network interface to a specific bus (e. g. CAN/LIN/IO/FlexRay) by the use of various transceivers. The piggyback is inserted in the network interface and can be replaced according to the bus requirements (please take note of the instructions in the network interface user manual).



WARNING!

Ensure an ESD safe working environment during disassembly and assembly. Avoid touching the top, bottom or connectors of the boards during this process to avoid ESD damage.

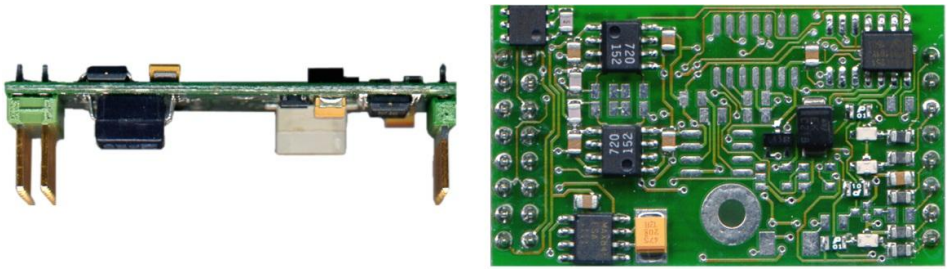


Figure 1: Piggyback

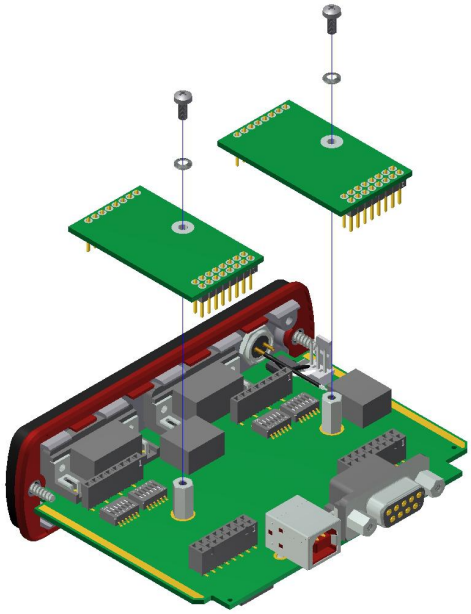


Figure 2: Example with VN1630A

3.1.1 CAN High-Speed

CANpiggy	Transceiver	Description	Part no.
1041Amag	TJA1041A	Magnetically decoupled, wake-up capable.	22082
1057Gcap	TJA1057G	Capacitively decoupled. Suitable for: > 2 Mbit/s CAN > CAN FD up to 5 Mbit/s guaranteed in simple networks > (8 Mbit/s depending on topology, P2P)	22070
1462BT	TJA1462BT	Electrically decoupled. Suitable for: > 1 Mbit/s CAN > higher than 5 Mbit/s CAN FD (CAN SIC) with many nodes and longer stubs > higher than 8 Mbit/s in peer-to-peer networks (CAN SIC)	22555

3.1.2 CAN SIC XL

CANpiggy	Transceiver	Description	Part no.
ALBI02	ALBI02	Electrically decoupled. Suitable for: > CAN: up to 1 Mbit/s (up to 2 Mbit/s depending on wiring and transceivers) > CAN FD: up to 5 Mbit/s (up to 8 Mbit/s depending on wiring and other transceivers on the bus) > CAN XL: up to 16 Mbit/s (up to 20 Mbit/s depending on wiring and other transceivers on the bus)	22589

3.1.3 CAN Low-Speed (fault tolerant)

CANpiggy	Transceiver	Description	Part no.
1055cap	TJA1055	Capacitively decoupled. Switchable terminating resistor.	22069

3.1.4 LIN

LINpiggy	Transceiver	Description	Part no.
7259	TLE7259-3GE	Electrically decoupled. Compatible to LIN2.x physical layer (12 V and 24 V). Provides dominant and recessive stress functionality.	22567

3.1.5 Single Wire CAN

CANpiggy	Transceiver	Description	Part no.
7356cap	NCV7356	Capacitively decoupled. 100 Ω resistance can be activated automatically upon switching over to high-speed mode. External power supply required.	22244

3.1.6 Truck & Trailer CAN

CANpiggy	Transceiver	Description	Part no.
10011opto	B10011S	Optically decoupled. External power supply required.	22031

3.1.7 Digital/Analog IO

IOpiggy	Transceiver	Description	Part no.
8642	-	Used for generation and measurement of analog and digital signals (see section IOpiggy 8642 on page 81).	22208
8644	-	Used for generation and measurement of analog and digital signals (see section VNpiggy30 IO 8644 on page 92).	22545

3.1.8 J1708

J1708piggy	Transceiver	Description	Part no.
65176opto	SN65176B	Optically decoupled.	22060

3.1.9 FlexRay

FRpiggy	Transceiver	Description	Part no.
1082cap	2x TJA1082 (Ch A and B)	Capacitively decoupled. With trigger feature.	22099

FRpiggyC	Transceiver	Description	Part no.
1082cap	2x TJA1082 (Ch A and B)	Compact FRpiggy. Capacitively decoupled. With trigger feature.	22121

3.1.10 Sensors

SENSORpiggy	Description	Part no.
SENT	SAE J2716 compatible piggy-back.	22435
UART	UART, RS232, RS485 (RS422) compatible piggyback.	22654
UARToverCAN	UART over CAN.	22704

3.1.11 Vehicle Electrics and GND/Earth

3.1.11.1 General Information



WARNING!

When using Vector devices, ensure that the power supply and earthing are correct. Failure to do so may result in damage to the vehicle electronics or the Vector devices due to overvoltage. Two typical scenarios are described below.

3.1.11.2 Vehicle Battery Only (Closed System)

In this scenario, the individual Vector devices are powered directly from the vehicle battery. A third device is powered via USB (e. g. from a notebook in battery mode or from the vehicle battery) or via PCIe (card mounted in a computer and powered from the vehicle battery). The system is therefore closed.

The common reference ground is the chassis, which is connected to the negative terminal of the vehicle battery. Vector devices that have a functional earth connection (FE) must also be connected to the reference ground.

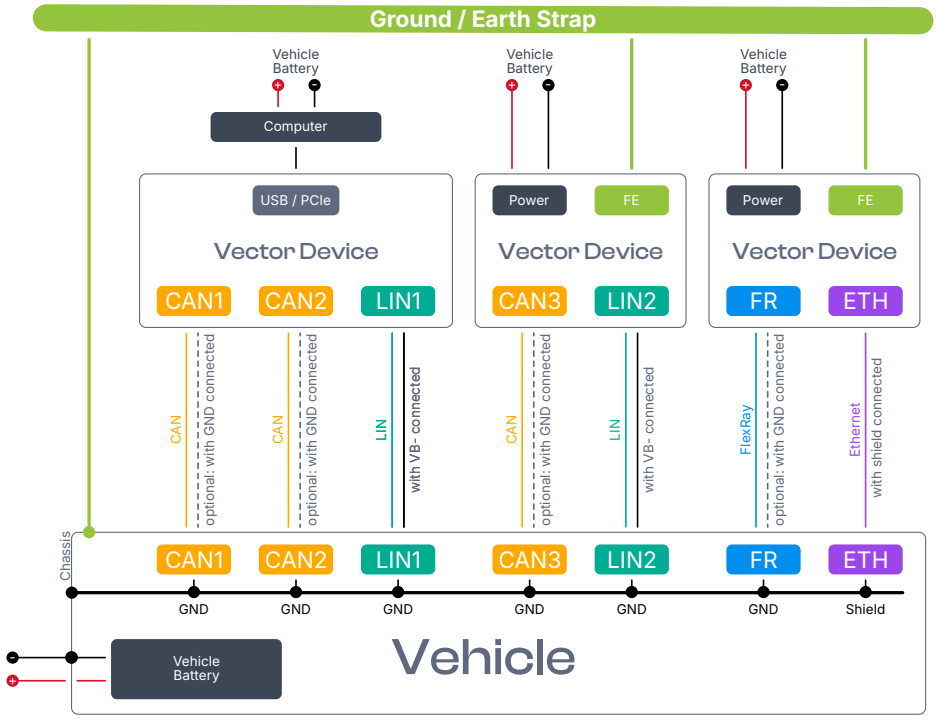


Figure 3: Vector devices powered by vehicle battery

The individual GNDs of the ECUs (in this example CAN, LIN, FlexRay) are connected to the chassis on the vehicle side. The shielding of the Ethernet connections is also connected to the chassis.

In this scenario, LIN VB- must be connected in the LIN signal path (LIN always requires VB- to be connected). For CAN and FlexRay it is recommended to connect all signal GNDs via their connectors (CAN GND, FlexRay GND) to have the same reference ground from the vehicle battery.

3.1.11.3 External Power Supplies (Test Bench)

In this scenario, the individual Vector devices are powered by individual power supplies. A third device is powered via USB or PCIe. This is a typical test bench scenario.

The common reference ground is earth, which is also connected to the chassis and to the negative terminal of the vehicle battery. Vector devices that have a functional earth connection (FE) must also be connected to the reference ground.

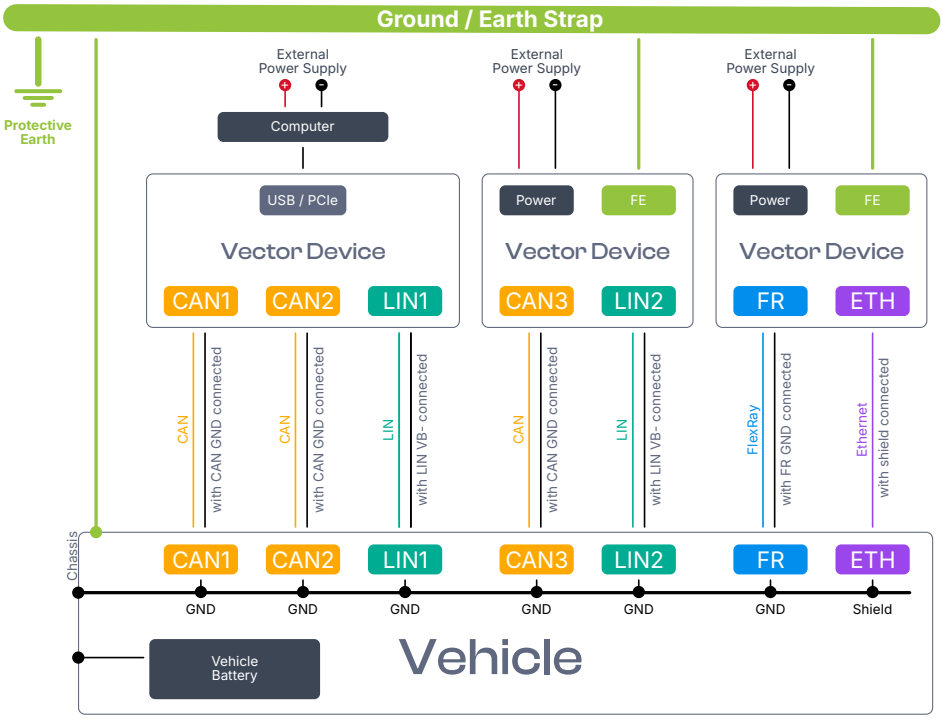


Figure 4: Test bench scenario

The individual GNDs of the ECUs (in this example CAN, LIN, FlexRay) are connected to the chassis on the vehicle side. The shielding of the Ethernet connections is also connected to the chassis.

In this scenario, all signal GNDs must be connected via their connectors (CAN GND, LIN VB-, FlexRay GND) to have the same reference ground.

3.1.12 Electrical Isolation

Note

The electrical isolation of the interfaces is a functional isolation that is used to avoid ground loops and interference between the networks. The voltage difference between the isolated areas must not exceed 60 VDC (isolation voltage). The isolation voltage usually exceeds the maximum permissible voltage at a port (operating voltage).

3.1.12.1 CANpiggy

Without external power supply

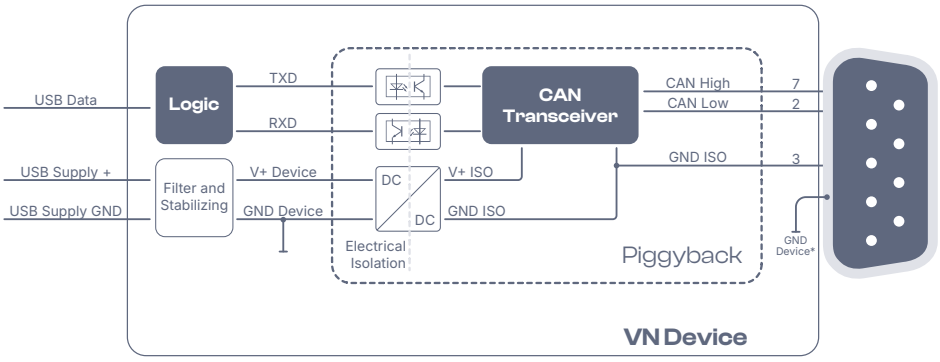


Figure 5: CANpiggy without external power supply

* connection of the D-SUB shell to the device housing depends on the device

With external power supply

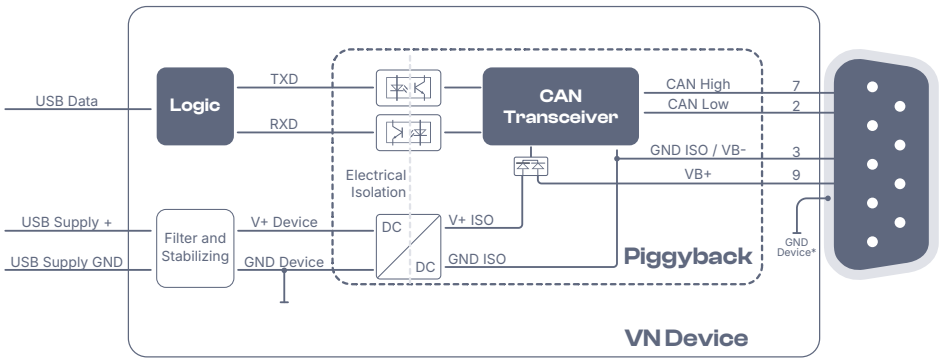


Figure 6: CANpiggy with external power supply

* connection of the D-SUB shell to the device housing depends on the device

3.1.12.2 LINpiggy

Switchable external power supply

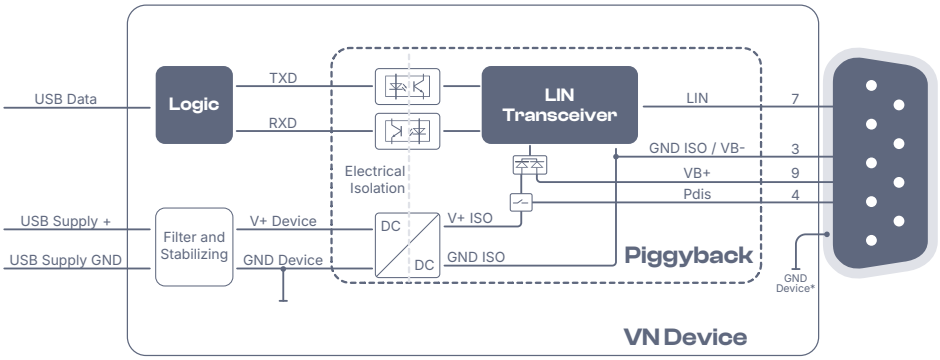


Figure 7: LINpiggy with switchable external power supply

* connection of the D-SUB shell to the device housing depends on the device

3.2 Compatibility

Transceiver

Suitable transceivers (piggybacks) for your network interface can be found in the following table.

	Transceiver	VN1500 Interface Family	VN1600 Interface Family	VN1641	VN1670	VN7572	VN7640	VN8970	VN8972	VH6501	VN1150
CAN High-Speed	1041Amag	✓	✓	-	✓	✓	✓	✓	✓	-	-
	1057Gcap	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	1462BT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CAN SIC XL	ALBI02	-	-	✓	✓	-	-	-	-	-	-
CAN Low-Speed	1055cap	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Single Wire CAN	7356cap	✓	✓	-	-	✓	✓	✓	✓	-	-
Truck & Trailer CAN	10011opto	-	-	✓	-	✓	✓	✓	✓	-	-
LIN	7259	✓	✓	-	✓	✓	✓	✓3)	✓3)	-	✓
FlexRay	1082cap	-	-	-	-	✓1)	✓1)	✓	✓1)	-	-
Sensor	SENT	✓	✓2)	-	-	-	-	-	-	-	-
	UART	-	-	✓	✓	-	-	-	-	-	✓
	UARToverCAN	-	-	✓	✓	-	-	-	-	-	✓
Miscellaneous	8642	-	-	-	-	✓	-	✓	✓	-	-
	8644	-	-	-	✓	-	-	-	-	-	-
	J1708 65176opto	✓	✓	-	-	✓	✓	✓	✓	-	-

✓ supported
- not supported
1) Compact FlexRay piggybacks only
2) VN1640/VN1640A only
3) Only with drivers for Windows 10/11 (Windows 7 not supported)



Reference

Please refer to our Vector KnowledgeBase for the latest list: https://support.vector.com/kb?id=kb_article_view&sysparm_article=e=KB0015966.

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4.1 D-SUB Pin Assignment

Primary pin assignment

The following table shows the pin assignment of the network interface's D-SUB connector, when a cab/piggyback is used individually or, if the D-SUB has a double pin assignment, used as the primary channel. Furthermore, the table applies to network interfaces with D-SUB15 connectors if the corresponding adapter cable is used, e. g. VNcable 3Y (except pin 5 - this optional "shield" is not offered by the VNcable 3Y).

		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
CAN High-Speed	**1041Amag**	-	CAN L	VB-	Split	Shield	-	CAN H	-	(VB+)
	1057Gcap	-	CAN L	VB-	-	Shield	-	CAN H	-	-
	1462BT	-	CAN L	VB-	-	Shield	-	CAN H	-	-
CAN SIC XL	**ALBI02**	-	CAN L	VB-	-	-	-	CAN H	-	-
CAN Low-Speed	**1055cap**	-	CAN L	VB-	RT1	Shield	-	CAN H	-	(VB+)
Single Wire CAN	**7356cap**	-	-	VB-	R100	Shield	-	CAN	-	VB+
Truck & Trailer CAN	**10011opto**	-	CAN L	VB-	-	Shield	-	CAN H	-	VB+
LIN	**7259**	-	Pdis	VB-	-	Shield	-	LIN	-	(VB+)
FlexRay	**1082cap**	Trig	BM A	VB-	BM B	Shield	-	BP A	BP B	-
J1708	**65176opto**	-	A	VB-	-	Shield	-	B	-	-
IO	**8642**	see section IOpiggy 8642 on page 81								
	8644	see section VNpiggy30 IO 8644 on page 92								
Sensors	**SENT**	-	-	VB-	-	-	-	SENT	-	VB+
	UART	-	RX/Line A	VB-	Pdis	-	-	TX/Line B	-	(VB+)
	UART overCAN	-	CAN L	VB-	-	-	-	CAN H	-	-

Details

Pin	Description
-	Reserved, e. g. for the secondary pin assignment of built-in transceivers in a network interface (e. g. VN1630 CH1/CH3, CH2/4).
CAN H	CAN High.
CAN L	CAN Low.
VB-	Electrically decoupled ground.
VB+	Positive supply voltage for electrically decoupled cabs/piggybacks. For voltage range see technical data of the according transceiver.
(VB+)	VB+ optional.
Shield[1)]	Optional shield connection in accordance with CiA 303-1 (CAN in Automation). Please note that the availability of 'Shield' at pin 5 depends on the Vector device in which the transceiver is used. Therefore, it may be unavailable on some devices.
R100	If a single-wire CANcab/CANpiggy is operated in a high-speed network, a terminating resistor must be placed in the network between CAN High and GND/VB-. In high-speed mode, the CANcab/CANpiggy connects such a resistor (100 ohm) in the circuit when a shunt is placed between pin 7 (CAN High) and pin 4 (R100).
Pdis	Power disable. If Pdis is connected to VB-, the internal power supply is disabled. In this case an external power supply is required at VB+.
RT1	**Only CANcab 1054mag, CANpiggy 1055cap:** If this pin is connected to pin 3 (VB-), the internal terminating resistor is reduced to 500 ohm. **Note:** Also valid for CANpiggy 1054mag when used with VN8970 or VN1600 interface family.
Trig	Trigger (see user's manual for further details).
BP	Bus plus.
BM	Bus minus.

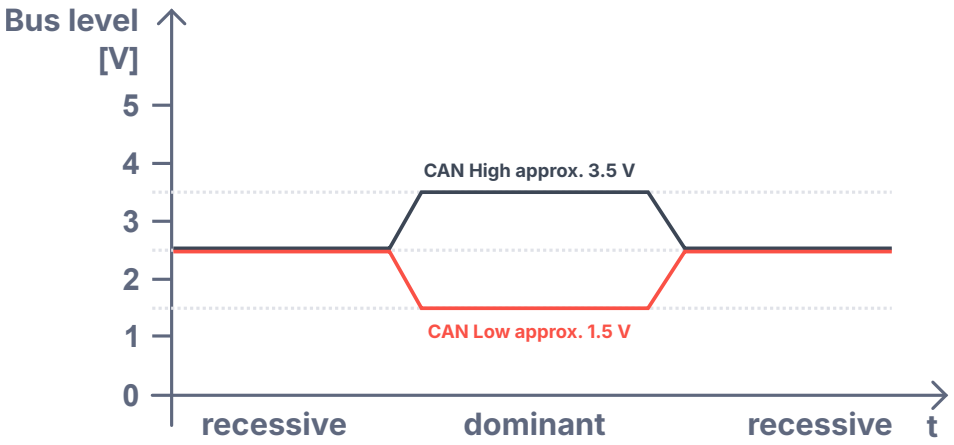
4.2 CAN High-Speed

4.2.1 General Information

Properties

High-speed cabs and piggybacks are fully compatible to the ISO 11898-2 standard and may be implemented for transmission rates up to 2 Mbit/s for CAN 2.0 and up to 8 Mbit/s for CAN FD (depends on the network).

Bus level



Test setup

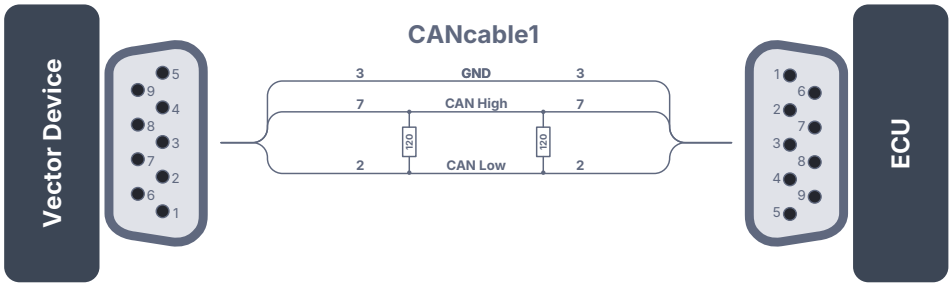


Figure 8: Connection between network interface and ECU e. g. via CANcable1

4.2.2 1057Gcap

Technical data

Voltage supply	By Vector network interface
Transceiver	TJA1057G
Maximum baudrate	> CAN High-Speed: 1 Mbit/s (if necessary 2 Mbit/s in peer-2-Peer connections) > CAN FD: 5 Mbit/s (if necessary 8 Mbit/s depending on bus physics)
Further properties	No unwanted error frames are generated (e.g. during shutdown)
Regulatory information	Korea: KCID "R-R-VeC-Piggy1057Gcap"

Electrical isolation

With this transceiver, the network interface is electrically isolated from the CAN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

4.2.3 1462BT

This piggyback uses a CAN SIC transceiver (Signal Improvement Capability) which reduces signal ringing in a network. It allows reliable CAN FD communication to function in larger topologies and features a much tighter bit timing symmetry performance.

Technical data

Voltage supply	By Vector network interface
Transceiver	TJA1462BT
Maximum baudrate	> CAN High-Speed: 1 Mbit/s > CAN FD (many nodes and longer stubs): higher than 5 Mbit/s > CAN SIC (CAN FD, peer-to-peer): higher than 8 Mbit/s
Further properties	> No unwanted error frames are generated (e.g. during shutdown) > Fully compatible to CiA 601-4 v2.0.0 (CAN SIC) > Fully compatible to ISO 11898-2 and SAE J2284-1 to J2284-5 > Can be used in legacy networks as well
Regulatory information	Korea: KCID "R-R-VeC-Piggy-1462BT"

Electrical isolation

With this transceiver, the network interface is electrically isolated from the CAN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

4.2.4 1041Amag

Technical data

Voltage supply	By Vector network interface or external 12 V...18 V DC
Transceiver	TJA1041A
Maximum baudrate	1 Mbit/s
Minimal baudrate	40 kbit/s
Isolation	Magnetically: ADuM 1100
Insulation voltage	Defined by network interface
Further properties	No unwanted error frames are generated (e. g. during shutdown)

Electrical isolation

With this transceiver, the network interface is electrically isolated from the CAN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

External voltage supply

An external voltage supply is possible via pin 9 at the D-SUB9 connector. The under voltage error detection of the transceiver is not possible in this case. This applies to both V_{Batt} and V_{CC}.

Split termination

The concept of the split termination is depicted in the figure below. In normal mode, this terminates the common mode signals via a capacitor to ground at the center tap point of the two 60 ohm resistors. This is an attempt to achieve a kind of stabilization of the recessive bus voltage of approx. 2.5 V. In all other modes, pin 4 is high impedance, and therefore the split termination is deactivated. The recommended capacitance value of capacitor C_{Split} is 4.7 nF.

The series resistance in the split line that is recommended for some applications is not needed here, since a lost ground may be caused only by a defect in the CANcab/CANpiggy.

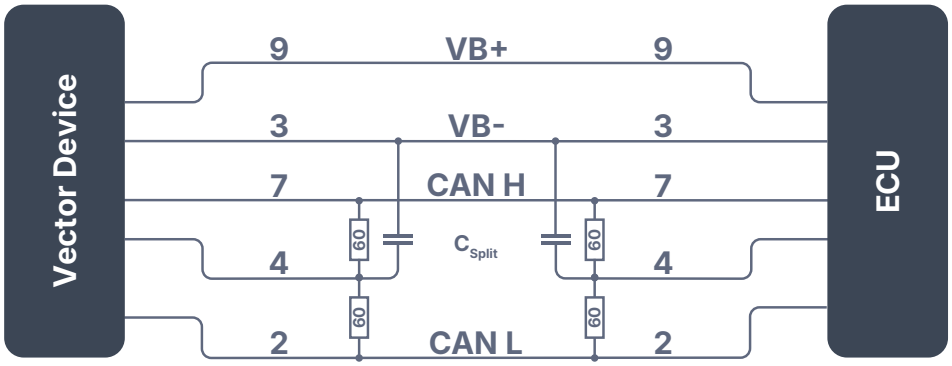


Figure 9: Setup example with external voltage supply and split termination

Programming of the normal and sleep Mode

The CANcab/CANpiggy 1041Aopto/mag supports both normal mode and sleep mode.

Switching between these modes is done with the CAPL function **setCanCabsMode**. Regarding this function it should be noted that the channel number is the logical channel number used by CANalyzer or CANoe according to the configuration in the Vector Hardware Manager.

The **setCanCabsMode** function has four parameters: ntype, nchannel, nmode and nflags each of type long. For high-speed CANcabs/CANpiggies the following values are valid:

setCanCabsMode

ntype	Meaning
0	Reserved and must be set to 0

nchannel	Meaning
0...n	CAN channel to be set

nmode	Meaning
0	NORMAL
1	SLEEP

nflags	Meaning
1	AUTOWAKEUP, only together with SLEEP



Example

The following example shows how to switch the CANcab/CANpiggy 1041Aopto/mag to standby mode with CANalyzer/CANoe and a CAPL program.

```
variables
{
}

on key '1'
{
   write ("CAN1 High-Speed: Normal Mode");
   setCanCabsMode(0, 1, 0, 0);
}

on key '2'
{
   write ("CAN1 High-Speed: Sleep Mode");
   setCanCabsMode(0, 1, 1, 1);
}

on key '3'
{
```

```
   write ("CAN2 High-Speed: Normal Mode");
   setCanCabsMode(0, 2, 0, 0);
}

on key '4'
{
   write ("CAN2 High-Speed: Sleep Mode");
   setCanCabsMode(0, 2, 1, 1);
}
```

4.3 CAN SIC XL

4.3.1 General Information

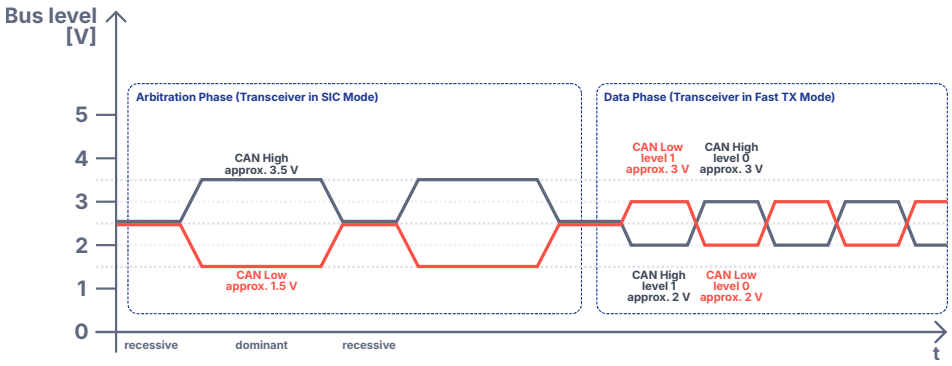
Properties

CAN SIC XL combines the advantages of CAN SIC (Signal Improvement Capability) and CAN XL. CAN SIC XL reduces signal ringing (SIC feature) and provides data rates of up to 20 Mbit/s with payloads up to 2048 bytes (CAN XL feature).

> CAN SIC
  - A SIC transceiver allows building more complex network topologies at higher communication bit rates. With current high-speed CAN transceivers 2 Mbit/s can be achieved with a linear network topology. 5 Mbit/s can be reached with a point-to-point communication. With a SIC transceiver, 5 Mbit/s can be achieved with networks that use stars and long stub lines.
  - A SIC transceiver reduces ringing caused by reflections in a network. This makes bit sampling more robust.
  - CAN SIC extends the performance of CAN FD and is backward compatible.

> CAN XL
  - A main advantage of CAN XL is its scalability. On the one hand, the user data can be set between 1 and 2048 bytes with a resolution of one byte; on the other hand, bit rates in the data phase can be selected between 1 Mbit/s (with an arbitration bit rate of 500 kbit/s) and up to 20 Mbit/s.
  - The second benefit of CAN XL is its flexibility. Thanks to new transceiver technologies, more complex network topologies such as stars and long stubs can be used. CAN's general CSMA/CR based arbitrating network access completes CAN XL's functional range.
  - CAN XL extends CAN FD and is backward compatible.

Bus level



Compatibility

Transceiver	CAN FD	CAN SIC	CAN SIC	CAN SIC XL
Controller	CAN FD	CAN FD	CAN XL	CAN XL
Payload	64 bytes	64 bytes	2048 bytes	2048 bytes
Bitrate (up to)	2 Mbit/s	8 Mbit/s	8 Mbit/s	20 Mbit/s
Topology	Linear	Complex	Complex	Complex
Signal improvement	-	Yes	Yes	Yes
Transceiver Fast Mode	-	-	-	Yes



Reference

Further details can be found in our KnowledgeBase.

4.3.2 ALBI02

This piggyback combines the advantages of a CAN SIC (Signal Improvement Capability) and a CAN XL transceiver. It reduces signal ringing in a network and provides data rates of up to 20 Mbit/s.



Note

The ALBI02 is a CAN SIC XL transceiver with pre-series status, suitable for evaluation purposes of the CAN XL technology. It supports all CAN SIC XL features. A later series version will replace this transceiver.

Technical data

Voltage supply	By Vector network interface
Transceiver	ALBI02
Maximum baudrate	> CAN: up to 1 Mbit/s (up to 2 Mbit/s depending on wiring and transceivers) > CAN FD: up to 5 Mbit/s (up to 8 Mbit/s depending on wiring and other transceivers on the bus) > CAN XL: up to 16 Mbit/s (up to 20 Mbit/s depending on wiring and other transceivers on the bus)
Further properties	> No unwanted error frames are generated (e.g. during shutdown) > Fully compatible to CiA 610-3 > Fully compatible to CiA 601-4 > Fully compatible to ISO 11898-2 and SAE J2284-1 to J2284-5 > Can be used in legacy networks as well

Electrical isolation

With this transceiver, the network interface is electrically isolated from the CAN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

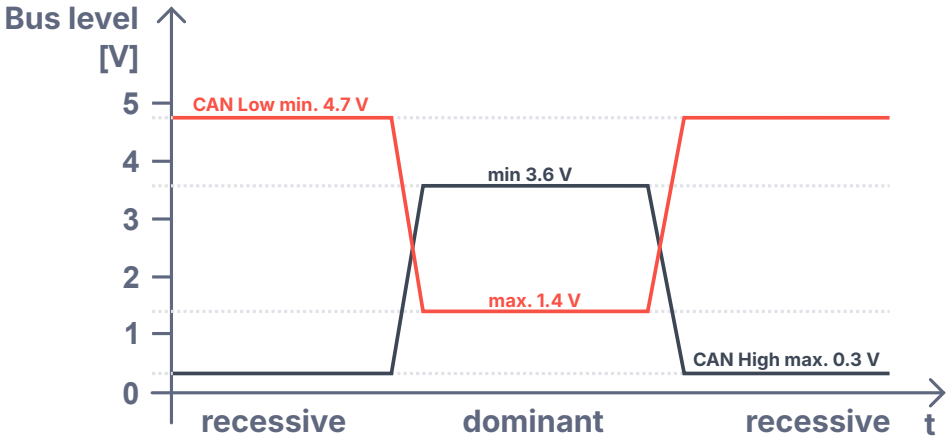
4.4 CAN Low-Speed (fault tolerant)

4.4.1 General Information

Properties

The low-speed CANcabs/CANpiggies are fully compatible to the ISO 11898-3 standard and can be implemented for transmission rates of up to 125 kbit/s.

Bus level in normal mode



Bus level in standby / sleep mode

> **CAN Low**
Approx. voltage supply

> **CAN High**
Approx. 0 V

Note

The voltage value of CAN Low depends on many factors and may fluctuate significantly in practice. If all bus nodes are in sleep mode, the transceivers connect CAN Low to V_{Batt} via the terminating resistance RTL. Since the transceivers have different supply voltages, this results in cross currents between the CAN nodes via the terminating resistors. In sleep mode, this can lead to false readings when measuring supply currents.

Test setup

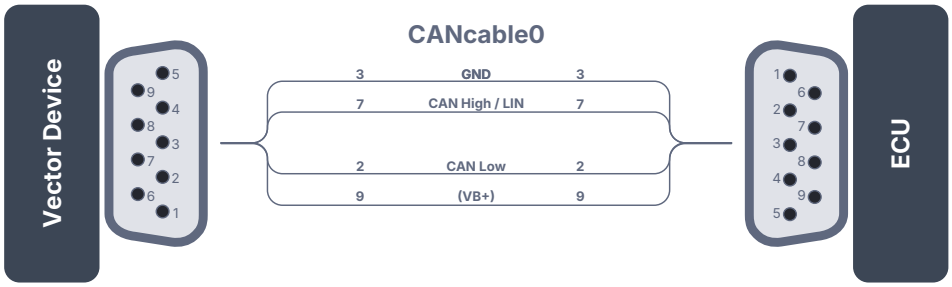


Figure 10: Connection between network interface and ECU e. g. via CANcable0

4.4.2 1055cap

Technical data

Voltage supply	By Vector network interface or external 12 V...18 V DC
Transceiver	TJA1055
Maximal baudrate	125 kbit/s
Minimal baudrate	40 kbit/s
Further properties	No unwanted error frames are generated (e.g. during shutdown). Switchable terminating resistor

Electrical isolation

With this transceiver, the network interface is electrically isolated from the CAN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

Programming of normal/sleep modes

The 1055cap supports both normal mode and sleep mode.

It is possible to toggle between the modes with the CAPL function **setCanCabsMode**. Regarding this function, it should be noted that the channel number is the logical channel number used by CANalyzer or CANoe according to the configuration in the Vector Hardware Manager.

The **setCanCabsMode** function has four parameters: ntype, nchannel, nmode and nflags each of type long. For low-speed CANcabs/CANpiggies the following values are valid:

setCanCabsMode

ntype	Meaning
0	Reserved and must be set to 0

nchannel	Meaning
0...n	CAN channel to be set

nmode	Meaning
0	NORMAL
1	SLEEP

nflags	Meaning
1	AUTOWAKEUP, only with SLEEP

Example

The following example shows how to switch the CANcab/CANpiggy 1054 (mag/opto) to standby mode with CANalyzer/CANoe and a CAPL program.

```
variables
{
}

on key '1'
{
   write ("CAN1 Low-Speed: Normal Mode");
   setCanCabsMode(0, 1, 0, 0);
}

on key '2'
{
   write ("CAN1 Low-Speed: Sleep Mode");
   setCanCabsMode(0, 1, 1, 1);
}

on key '3'
{
   write ("CAN2 Low-Speed: Normal Mode");
   setCanCabsMode(0, 2, 0, 0);
}

on key '4'
{
   write ("CAN2 Low-Speed: Sleep Mode");
   setCanCabsMode(0, 2, 1, 1);
}
```

External voltage supply

The bus-side voltage can be supplied by an external voltage source. This is especially recommended if current measurements are performed on the ECU while the CAN bus is in sleep mode.

Switchable terminating resistors

The 1055cap has an internal switchable terminating resistor. Via parallel connection, the terminating resistor is reduced from 4.7 kohm to 500 ohm. This is useful in applications where only a few ECUs exist in the network.

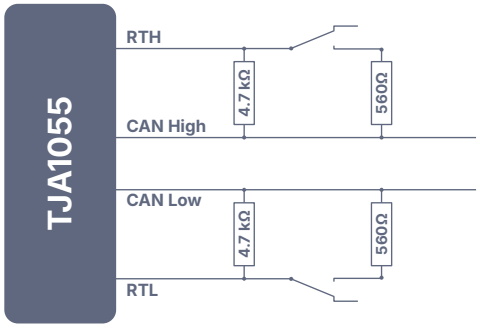


Figure 11: Switching terminating resistors

To enable the terminating resistor, pin 4 of the D-SUB9 connector has to be connected to ground (see details on RT1 on page 45). If pin 4 is not connected to ground, the value of the terminating resistor is 4.7 kohm.

4.5 LIN

4.5.1 General Information

Properties

The LINcab/LINpiggy conforms to the LIN standard (Local Interconnect Network) and is specified for transmission rates of up to 20 kbit/s in normal mode as well as 115 kbit/s in flash mode.

The LIN bus communicates over a single-wire bus and is based on a master-slave concept. Consequently, no arbitration or collision management is needed in the slave nodes.

LIN communication principle:

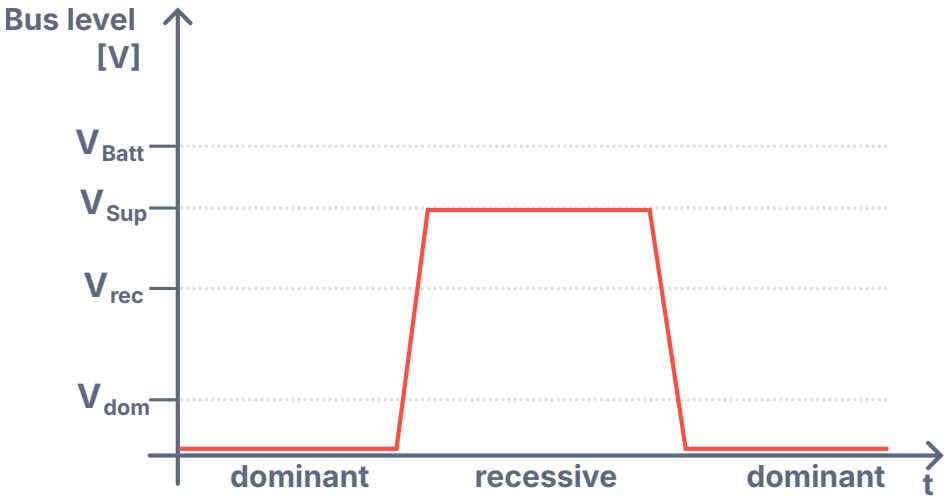
> The LIN master generates the message header and places it on the bus. The message header consists of the sync break, sync field and ID field.

> The addressed LIN slave node places its message response on the bus after the message header. The message response is composed of 0...7 data bytes and a checksum field.

> The individual bytes of a message are transmitted according to the conventional UART protocol (1 start bit, 8 data bits, and 1 stop bit).

Bus level

The following figure depicts the voltage levels on the LIN bus. V_{Batt} is the supply voltage of the ECU that is LIN master. The bus voltage can be changed to the recessive case (V_{Sup}) by means of filter elements and dynamic voltage changes in the supply voltage of the master ECU.



Bus-side voltage supply

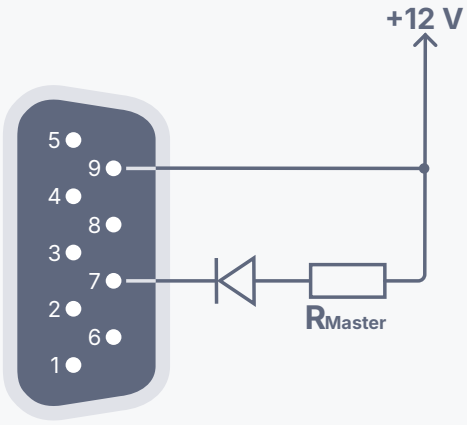
Since the recessive level on the bus depends on the supply voltage of the master, it is advisable to operate the LINcab/LINpiggy with an external supply voltage that is also used by the other bus nodes. This prevents cross currents between the individual nodes on the LIN bus.

Connecting **Pdis** with **VB-** of the D-SUB of the network interface disables the

internal voltage supply of the LINcab/LINpiggy. This makes it possible to perform measurements on the LIN bus, even with an external supply below 12 V.

Note

If an external master resistor and an external voltage supply are being used at the D-SUB9 connector of the LINcab/LINpiggy, a diode should be connected in series (see figure below). Otherwise the LINcab/LINpiggy would be supplied by the LIN bus over the external master resistor, if the external voltage supply was broken. This diode is necessary according to the LIN specification.



4.5.2 7259

Technical data

Voltage supply	By Vector Network Interface: 12 V External: ca. 8 V ... 36 V (Pdis used)
Transceiver	TLE7259-3GE
Maximal baudrate	Normal mode: 20 kbit/s Flash mode: 115 kbit/s* *Depending on the bus physics, the maximum data rate can be much higher, see notes in the network interface manuals.
Electr. Isolation	Yes
Insulation voltage	Defined by network interface
Bus termination	Master mode: 1 kohm Slave mode: 30 kohm

Electrical isolation

With this transceiver, the network interface is electrically isolated from the LIN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

Properties

The 7259 transceiver is designed for 24 V applications. In addition, it has a time out counter, which avoids a constant dominant level on the LIN bus in error cases. The minimum switch off time of the transceiver is 6 ms.

Stress functionality

The stress functionality of the LINpiggy enables you to disturb the LIN bus by dominant or recessive disturbing bits. The duration of disturbing bits is not limited.



Note

Recessive disturbing sequences have a current limitation of 520 mA, dominant disturbing bits are protected by a 100 mA fuse.

In both disturbing modes, the LINpiggy 7259 has a protection against electrical and thermal overloads. The LINpiggy must be supplied externally to use the recessive disturbing mode.

Minimal baudrate

Due to the dominant timeout (8...20 ms) of the TLE7259-3GE, it may not be possible to transmit a LIN header at very low baudrates. Therefore intended dominant sequences longer than 6 ms are created using the LINpiggy's integrated transistor circuitry.

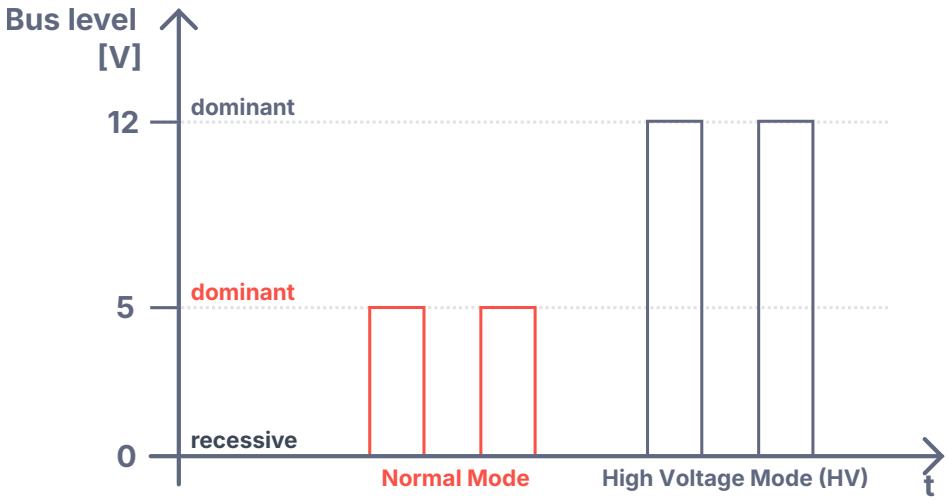
Flash mode

The flash mode enables higher data transmission rates which can be used for programming microcontrollers during the ECU production. This is possible by an increased slew rate of the transceiver, which may also affect EMC properties.

4.6 Single Wire CAN

4.6.1 General Information

Bus Levels



Bus communication

To establish communications between the individual network nodes, VB+ has to be connected to pin 9, GND/VB- to pin 3 and CAN to pin 7 at the D-SUB connector.

If the Single Wire CANcab/CANpiggy is operated in a high-speed network, a terminating resistor must be available between CAN High and GND/VB-. In high-speed mode, such a resistor (100 ohm) is enabled by the CANcab/-CANpiggy if pin 7 (CAN High) is connected to pin 4 (R100).

The resistor is disabled, if the CANcab/CANpiggy switches back to normal mode. To implement higher impedance terminating resistances, another resistor (RR) may also be added instead of a direct connection between CAN High and R100. The total resistance is RR +100 ohm.

4.6.2 7356cap

Technical data

Voltage supply	External 12 V...18 V DC
Transceiver	NCV7356
Maximum baudrate	Low-speed: 40 kbit/s High-speed: 100 kbit/s
Further properties	No unwanted error frames are generated (e.g. during shutdown)

Electrical isolation

With this transceiver, the network interface is electrically isolated from the CAN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

External voltage supply

The CANcab/CANpiggy has to be operated with an external voltage supply. This voltage is used as the level for the dominant state of the wake-up message.

Programming transceiver modes

The Single Wire CAN transceiver supports normal mode, high-speed mode and sleep mode.

Switching the transceiver modes is done with the CAPL function **setCanCabsMode**. Regarding this function it should be noted that the channel number used by CANalyzer or CANoe is the logical channel number. Furthermore, it is not possible to set the mode explicitly for one channel while preserving the mode of the other channel; modes must always be set for both channels.

The **setCanCabsMode** function has four parameters: ntype, nchannel, nmode and nflags each of type long. For Single Wire CANcabs/CANpiggies the following values are valid:

setCanCabsMode

ntype	Meaning
0	Reserved and must be set to 0

nchannel	Meaning
0...n	CAN channel to be set

nmode	Meaning
0	NORMAL
1	SLEEP
2	HIVOLTAGE
3	HISPEED

nflags	Meaning
1	AUTOWAKEUP, only with SLEEP
2	HIGHPRIO, only CANcab 5790c, 1 = clear send buffer

Transmission rate

For normal data exchange, normal mode is used with a transmission rate of up to 40 kbit/s. The high-speed mode is available for transmission rates up to 100 kbit/s, for example for flash programming. However, in this mode the number of bus nodes is limited. The high-voltage mode is needed to send the high-voltage wakeup message (12 V). The transceiver's transmitter is deactivated in sleep mode. Additionally, there is a high priority flag which clears all send buffers.



Example

Example of a CAPL program for sending a high-voltage wakeup message on CAN channel 1. CAN channel 2 is unused in normal mode.

```
variables
{
    message 0x100 msg;
}

on start
{
    msg.CAN = 1;
    msg.DLC = 0;
}

on key 'w'
{
    // Switch transceiver of channel 1 in high-voltage
mode,
    // transceiver of channel 2 in normal mode.
    setCanCabsMode(0, 1, 2, 0);
    setCanCabsMode(0, 2, 0, 0);

    // Send message.
    output(msg);

    // After wake-up message switch transceivers of
both channels
    // back to normal mode.
    setCanCabsMode(0, 1, 0, 0);
    setCanCabsMode(0, 2, 0, 0);
}

on message *
{
    output(this);
}
```

4.7 J1708

4.7.1 General Information

Properties

These transceivers enable access to serial networks according SAE standard J1708 respective J1587 and is used predominantly in commercial vehicles. Typical applications of the J1708 network are diagnostic and process data communication.

4.7.2 65176opto

Technical data

Voltage supply	By Vector network interface
Current consumption	Approx. 200 mA
Transceiver	SN65176B
Maximal baudrate	9.6 kbit/s
Isolation	Optical: HCPL-0720-500 or compatible
Bus termination	yes, 2 x 4.7 kohm

Electrical isolation

With this transceiver, the network interface is electrically isolated from the CAN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

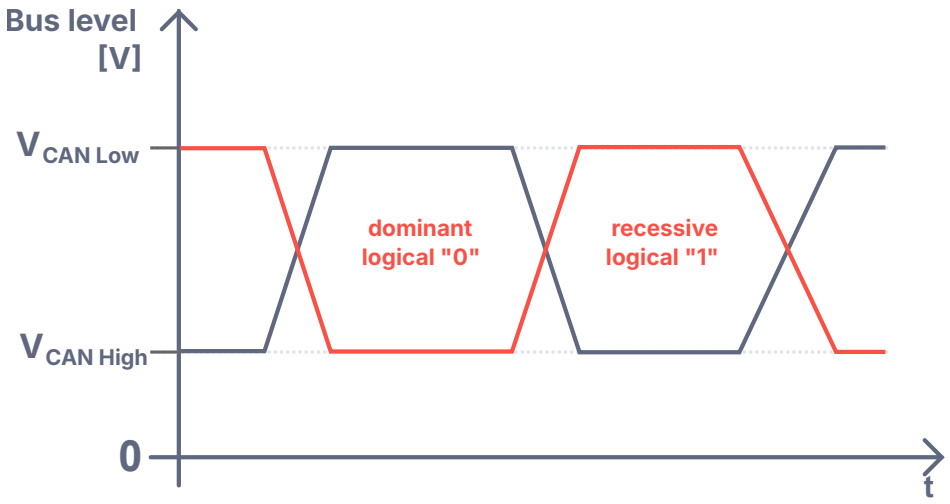
4.8 Truck & Trailer CAN

4.8.1 General Information

Properties

The Truck & Trailer CANcab/CANpiggy is compatible with the ISO 11992-1 standard and has been developed for CAN low-speed applications in the commercial vehicle area. The maximum transmission speed is 250 kbit/s.

Bus level



Recessive state

The recessive state is described by the following voltage relation:

- V_S: bus side voltage
- $V_{CAN\_H} = 1/3\ V_S$
- $V_{CAN\_L} = 2/3\ V_S$

Dominant state

For the dominant levels this relation applies:

- $V_{CAN\_H} = 2/3\ V_S$
- $V_{CAN\_L} = 1/3\ V_S$

Differential voltage

This yields the following differential voltage:

- $V_{diff} = V_{CAN\_L} - V_{CAN\_H}$
- $V_{diff} = 1/3\ V_S$recessive state
- $V_{diff} = -1/3\ V_S$dominant state

4.8.2 10011opto

Technical data

Voltage supply	External 16 V...32 V DC
Current consumption	120 mA (typ.)
Transceiver	B10011S
Maximal baudrate	250 kbit/s
Isolation	Optical: HCPL-0720-500 or compatible
Insulation voltage	Defined by network interface

Electrical isolation

With this transceiver, the network interface is electrically isolated from the CAN bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

Connection cable

The following connection cables can be used with the 10011opto:

> CANcable TnT (page 107)
> CANcable TnT Term (page 108)

Hardware

The CANcable TnT has a D-SUB9 connector and four bunch plugs to connect to an external voltage supply and the CAN bus.

According to ISO 11992-1, a Truck & Trailer CAN system consists of two nodes, which should be terminated. If the Vector network interface is used together with the CANcab/CANpiggy 10011opto to observe bus traffic between two real ECUs, the CANcable TnT should be used, since both ECUs already have a terminating resistor. If only one real ECU is connected to the CANcab/CANpiggy 10011opto, the CANcable TnT Term should be used.

Bus-side voltage supply

The CANcab/CANpiggy 10011opto has to be operated with an external voltage supply. ISO 11992-1 specifies at least 16 V supply voltage (V_S) for 24 V systems.

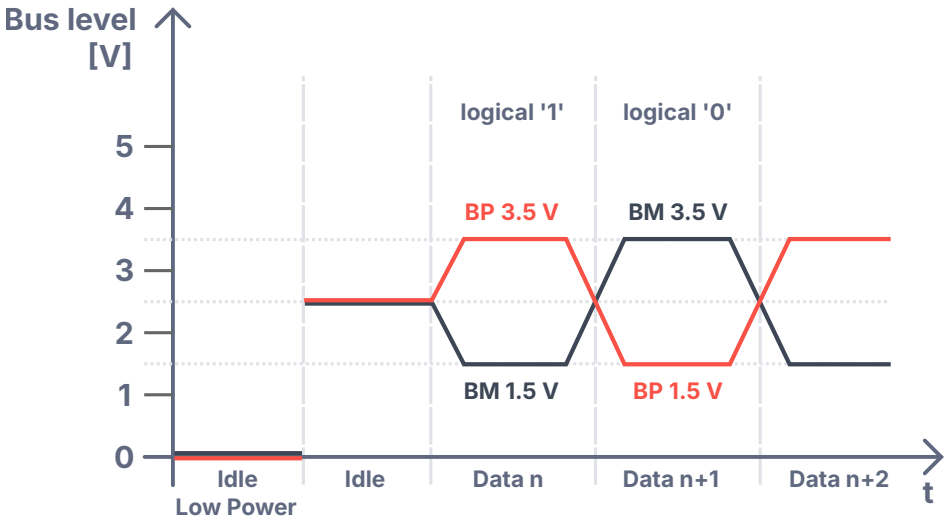
4.9 FlexRay

4.9.1 General Information

Properties

The FlexRay transceivers are compatible to the *FlexRay Communications System Electrical Physical Layer Specification Version 2.1 Rev. A* and can be used with 10 Mbit/s per channel (A/B).

Bus level



4.9.2 1082cap

Technical data

Voltage supply	By Vector network interface
Transceiver	TJA1082
Baudrate	10 Mbit/s
Further properties	Trigger

Electrical isolation

With this transceiver, the network interface is electrically isolated from the FlexRay bus. The transceivers' voltage supply is electrically isolated via a DC/DC converter.

Trigger

The FlexRay interface family offers a pin for dedicated trigger applications (see the according pin assignment). The configuration of the trigger and its action is set in the application (e. g. CANoe). The following picture depicts the internal circuit of the trigger pin.

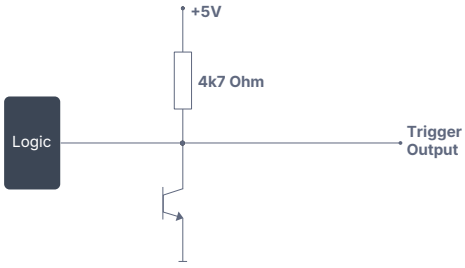


Figure 12: Trigger output

Output

The application's trigger releases a falling edge on the trigger pin. By using external pull up resistors, the maximum allowed load is 5 mA.

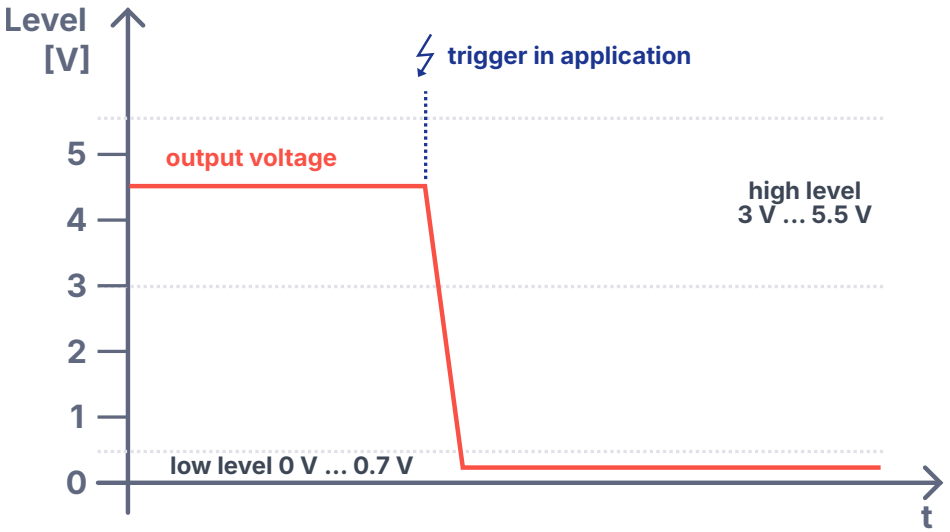


Figure 13: Trigger output

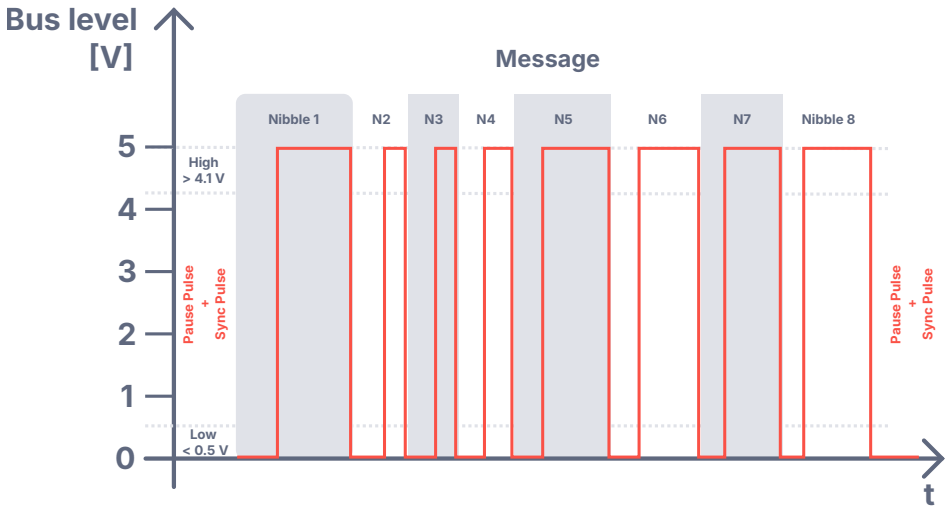
4.10 Sensors

4.10.1 SENT (Single Edge Nibble Transmission)

Properties

The SENSORpiggy SENT is compatible to the SAE J2716 protocol with a maximum data rate of 64.9 kbit/s (at a clock tick period of 3 µs).

Bus level



Operating modes

The SENSORpiggy SENT offers three operating modes:

> **ECU simulation (receiving data)**
In this mode, the SENSORpiggy SENT actively supplies a sensor through V_{supply} and receives its data.

Signals	Description
Sensor voltage supply	5 V (current limited to 50 mA)
Data line	Received data from a connected sensor
VB-	Reference potential for data line and sensor supply voltage

WARNING!

Warning of damage

To avoid damage to the SENSORpiggy SENT, disconnect all external power supplies when performing ECU simulation!

> **Sensor simulation (sending data)**

In this mode, the SENSORpiggy SENT is supplied by an external ECU through V_{supply} or by a vehicle through V_{bat}. The SENSORpiggy SENT transmits generated sensor data to the connected ECU then.

Signals	Description
Input voltage	Data transmission starts as soon as the measured input voltage reaches a trigger level of >=4.6 V. Data transmissions stops when the measured input voltage level is <=4.2 V.
Data line	Transmitted data to a connected ECU
VB-	Reference potential for data line and input voltage

> **Trace**

This mode is a combination of the previous described modes. In trace mode, the SENSORpiggy SENT acts as a spy node between a sensor and an ECU. The bus will not be disturbed in this configuration. The SENSORpiggy SENT receives the messages which are sent from the sensor to the ECU and it also measures the supply voltage of the connected sensor, giving notice if operation level is present or not.

Signals	Description
Input voltage	Measures supply voltage to observe data traffic and proper operation
Data line	Received data from sensor
VB-	Reference potential for data line and input voltage

Technical data

Voltage supply	By Vector network interface
Supported modes	ECU simulation, sensor simulation, trace
Sensor voltage supply	> **ECU simulation** 5 V, limited to 50 mA ± 10 % tolerance **WARNING!** To avoid damage to the SENSORpiggy SENT, disconnect all external power supplies when performing ECU simulation! The maximum permissible externally applied voltage in the event of a fault is **5.3 V**. > **Sensor simulation** Typical: 5 V (expected) Max: 44 V
Baudrates	> Min: approx. 24.7 kbit/s at clock tick period of 3 µs > Max: approx. 64.9 kbit/s at clock tick period of 3 µs
Clock tick period	3 ... 90 µs
Regulatory information	Korea: KCID "R-R-VeC-PiggySENT"

Electrical isolation

With this piggyback, the network interface is electrically isolated from the SENT bus. The piggybacks voltage supply is electrically isolated via a DC/DC converter.

4.10.2 UART

Properties

The SENSORpiggy UART is compatible with UART, RS232, and RS485 (RS422) and has the following physical features:

> 1x UART, RS232, or RS485 (RS422)
> Operating mode switchable in the Vector Hardware Manager
> Pin assignment can be found in section UART on page 48

UART

> Full-duplex data transfer with Tx and Rx signals
> Levels: 1.8 V, 3.3 V, 5 V or externally supplied voltage VB+ (switchable via Pdis and Vector applications). The following tolerances apply to the switching thresholds and output levels:

Supply Voltage	Input Low	Input High	Output Low	Output High
VDD 1.8 V	0.00 V nom.	1.80 V nom.	0.00 V nom.	1.80 V nom.
	0.63 V max.	1.17 V min.	0.40 V max.	1.35 V min.
VDD 3.3 V	0.00 V nom.	3.30 V nom.	0.00 V nom.	3.30 V nom.
	0.80 V max.	2.00 V min.	0.50 V max.	2.40 V min.
VDD 5.0 V	0.00 V nom.	5.00 V nom.	0.00 V nom.	5.00 V nom.
	1.50 V max.	3.50 V min.	0.80 V max.	4.44 V min.
VB+ 1.65 V ... 5.5 V	0.00 V nom.	VB+ nom.	0.00 V nom.	VB+ nom.
			0.30 V max.	VB+-0.4 V min.

> The signal output can drive a minimum current of 4 mA
> Up to 1 Mbps

RS232

> Full-duplex operation with no control lines
> Termination: 5 kohm, switchable
> Up to 230 kbps
> Levels and currents according to TIA-232-F (RS-232)

RS485 (RS422)

> Half-duplex (RS485 only; RS422 for sending or receiving only)
> Termination: 120 ohm, switchable
> Up to 16 Mbps
> Levels and currents according to TIA ANSI/TIA/EIA-485-A (RS-485)

Higher-layer

The higher-layer protocols support (not part of the piggyback itself):

Number of data bits: 7, 8 or 9

> Number of stop bits: 1 or 2
> Parity modes: None, Odd, Even, Mark or Space

Technical data

Regulatory information	Korea: KCID "VeC-PiggyUART"

4.10.3 UARToverCAN

Properties

The SENSORpiggy UARToverCAN uses a CAN FD transceiver for UART data. This allows you to achieve high data rates at low cost.

> 1x UARTover CAN
> Pin assignment can be found in section UART on page 48

Higher-layer

The higher-layer protocols support (not part of the piggyback itself):

> Number of data bits: 7, 8 or 9
> Number of stop bits: 1 or 2
> Parity modes: None, Odd, Even, Mark or Space

Technical data

Voltage supply	By Vector network interface
Transceiver	TJA1057G
Maximum baudrate	CAN High-Speed: 1 Mbit/s (if necessary 2 Mbit/s in peer-2-Peer connections)
Further properties	No unwanted error frames are generated (e.g. during shutdown)
Regulatory information	Korea: KCID "VeC-PiggyUARToCAN"

5 IO Piggybacks

In this chapter you find the following information:

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5.1 IOpiggy 8642

5.1.1 General Information

Introduction

The IOpiggy 8642 is a plug-in board (piggyback) designed for measurements and outputs of digital or analog signals. This plug-in board can be used with the following Vector devices:

- **VN7570 / VN7572 FlexRay/CAN/LIN/IO network interface**
  Measurement lines accessible via D-SUB62 connector.
- **VN8950 CAN/LIN module**
  Measurement lines accessible on channel 5 via D-SUB15 connector.
- **VN8970 / VN8972 FlexRay/CAN/LIN module**
  Measurement lines accessible on channel 9 via D-SUB15 connector.

Signal lines

The IOpiggy 8642 offers a total of thirteen signal lines. Depending on the configuration, the maximum selectable IO lines are:

- 8x digital input
- 6x digital output
- 4x analog input
- 2x analog output
- 2x PWM output
- 1x PWM input
- 1x analog comparator

Note

The lines may be operated as either input or output. Mixed operation of one line is not possible. Mixed configuration of different lines is allowed.

The configuration is performed in your measurement application (e. g. CANoe). You can define your own measurement condition there for each defined measurement group. When a condition is fulfilled, the related signal values of the measurement group are acquired and passed to the application.

Measurement group 1	Measurement group 2	Measurement group 3
Digital In 0...7	Analog In 0...3	Capture
↯Measurement Condition	↯Measurement Condition	↯Measurement Condition

The following measurement conditions are available for selection:

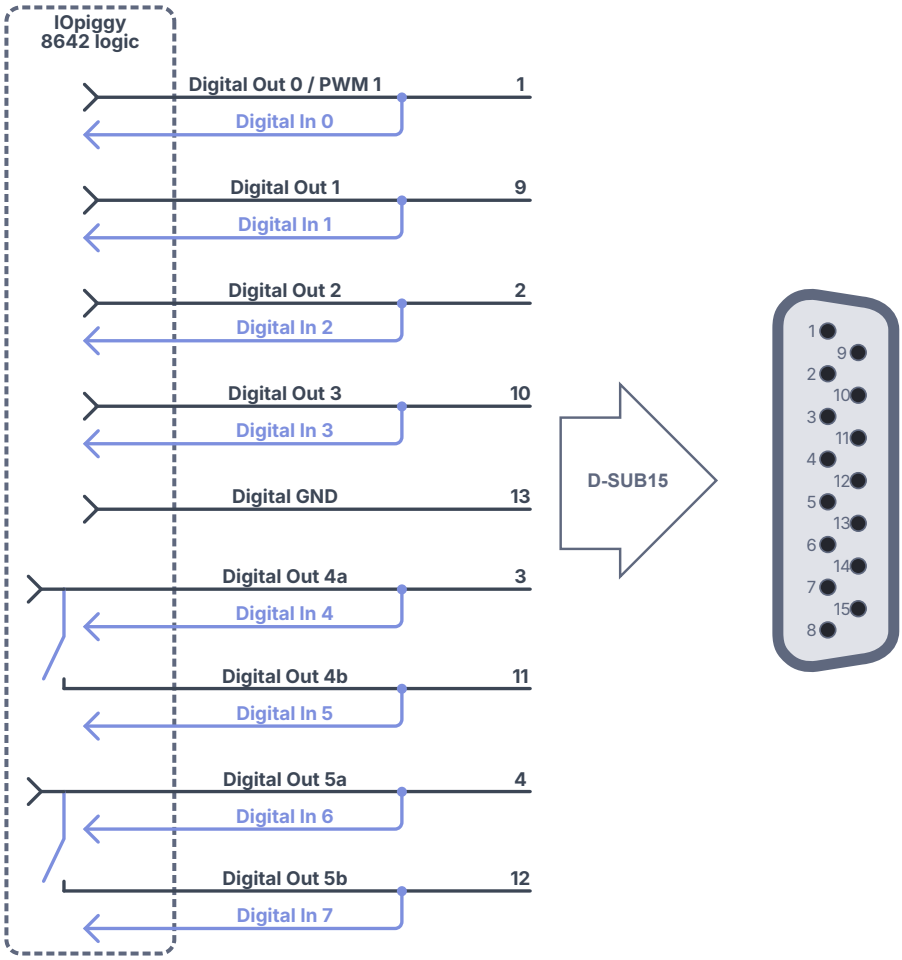
- Cyclic measurement
- Selective polling in the measurement application
- Measurement by level changes (trigger)
  (High → Low and Low → High) at the digital inputs
- Measurement on triggering of the analog comparator
  (see section Analog Comparator on page 87)

5.1.2 Digital Inputs and Outputs

Description

All digital signal lines can be used as either an input or output. This can be configured in the measurement application (e. g. CANoe). The following diagram illustrates the switching logic:

Switching logic for digital signals



Inputs

The switching threshold can be defined over a range of 0 V ... 20 V for all eight digital inputs (Digital In 0...7) with a constant hysteresis of 1 V.

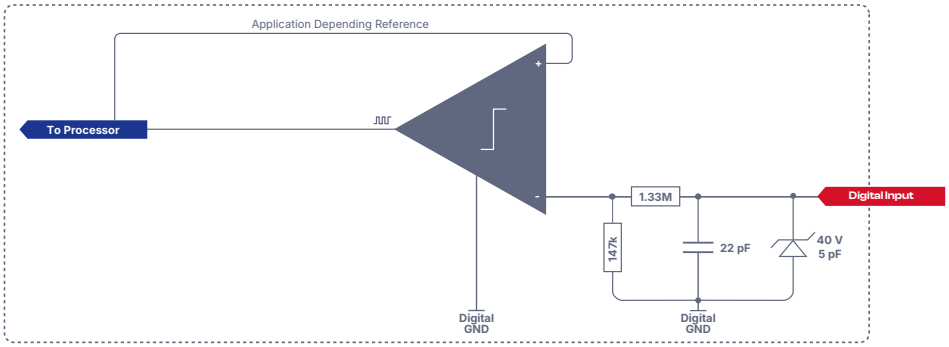


Figure 14: Digital input

Outputs

You can operate the digital outputs in three different modes. They are configured in your measurement application.

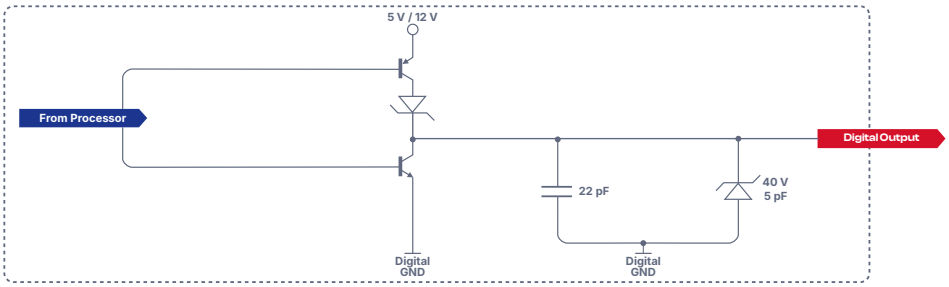


Figure 15: Digital output

> **Push-Pull (only Digital Out 0...3)**
The LOW state corresponds to digital GND, and the HIGH state corresponds to the internal output voltage defined (by software). To prevent short circuits, you should never interconnect two push-pull outputs. Since the push driver loads the internal supply, the push output delivers less current than the pull input can take.

> **Open-Collector (only Digital Out 0...3)**
The LOW state corresponds to digital GND, and the HIGH state corresponds to the external voltage applied via a pull-up resistor (current rating see section Technical Data on page 89).

> **MOS switch (only Digital Out 4a/4b and 5a/5b)**
Floating switch for switching external signals. The signals to be switched are connected to the a/b lines provided. Suitable for all signals between -36 V and + 36 V.

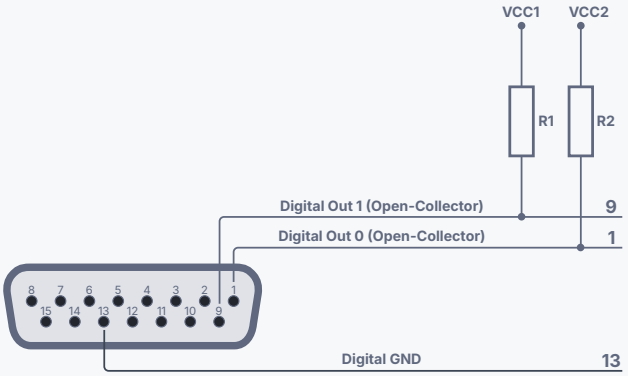
Note

The digital outputs 4a/4b and 5a/5b of the IOpiggy 8642 are implemented as switching outputs through PhotoMOS relays (switching time see section Technical Data on page 99). The limit frequency of the relays indicates the damping of the signal to be switched (the signal forms can be changed).

Example

Digital output in Open-Collector mode

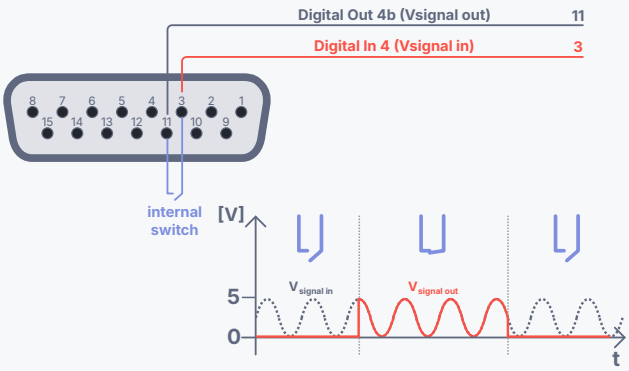
Digital Out 0 and 1 are configured as Open-Collector outputs. This requires a constant voltage to be applied via an external pull-up resistor. While LOW is defined with Digital GND, HIGH depends on the externally applied voltages.



Example

Digital output with external signal source

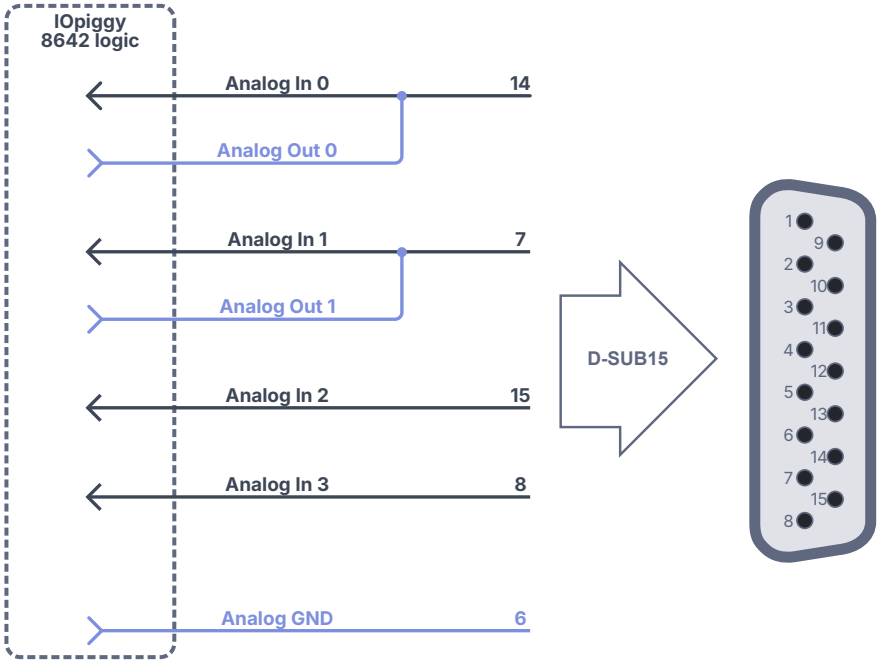
This example involves toggling a sinusoidal source voltage $V_{signal\ in}$ on and off arbitrarily. In the example, this is done by applying $V_{signal\ in}$ to Digital In 4. The voltages can now be toggled on and off at Digital Out 4b via the internal switch. The measurement application controls switching.



5.1.3 Analog Inputs and Outputs

Description

The IOpiggy 8642 has four analog inputs. Optionally, the first two inputs (A0 and A1) can be used as analog outputs. This can be configured in the measurement application (e. g. CANoe). The following diagram illustrates the switching logic:



Inputs

You can operate the analog inputs in the following mode:

> **Single-Ended (Analog In 0 ... 3)**
The common reference potential for measurement of the voltages is Analog GND. Four independent signal lines are available for this.

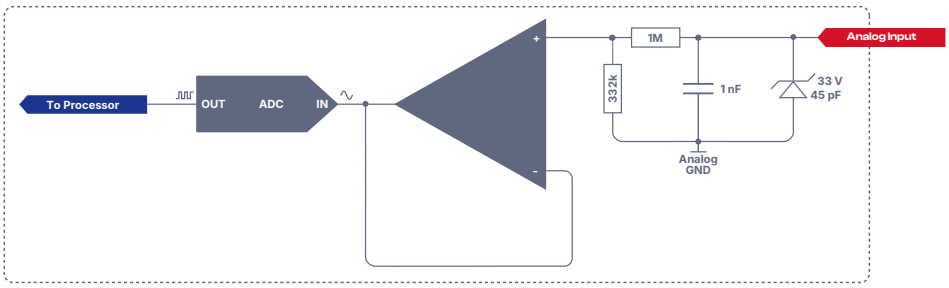


Figure 16: Analog input

Outputs

A voltage between 0 V and 12 V can be provided. An analog output can drive a maximum current of 10 mA (at 5 V) and 6 mA (at 12 V) respectively.

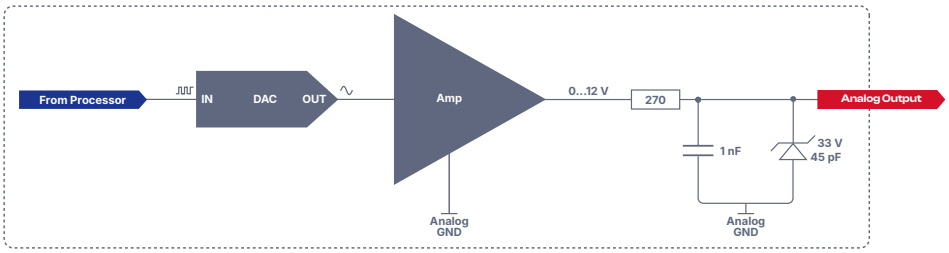


Figure 17: Analog output

5.1.4 PWM Outputs (PWM0/PWM1)

Description

The IOpiggy 8642 has PWM generators at pin 1 (PWM 1) and at pin 5 (PWM 0), which are operated at a common frequency. The configurable frequency range is between 0.02 Hz and 20 kHz. The two PWM duty cycles are configured in the measurement application and may be set independently over the range 0.0 % to 100.0 %. The duty cycle resolution is 8 bits over the entire frequency range.

5.1.5 PWM Input (PWM0)

Description

You can use the PWM input to measure the duty cycle of a PWM signal.

The minimum pulse width is 1 µs. This yields a maximum input frequency of 100 kHz (at a 50 % duty cycle).

5.1.6 Analog Comparator

Description

The analog comparator is permanently connected to Analog Input 0 and enables trigger-controlled measurements. A threshold is defined in the measurement application for this purpose. If the upper or lower threshold limit is exceeded, this triggers a single measurement at the configured measurement groups (see section General Information on page 81).

The trigger can be configured for three cases:

- Trigger when upper limit exceeded
- Trigger when lower limit exceeded
- Trigger on either upper or lower limit violation

5.1.7 D-SUB15 Pin Configuration Examples

The following table shows examples of different pin configurations defined in the measurement application (e. g. CANoe):

Pin	Config 1	Config 2	Config 3	Config 4
1	Digital In 0	Digital Out 0[1]	Digital Out 0[2]	PWM 1
2	Digital In 2	Digital Out 2[1]	Digital Out 2[2]	-
3	Digital In 4	Digital Out 4a[3]	-	-
4	Digital In 6	Digital Out 5a[3]	-	-
5	PWM 0	Capture	-	-
6	**Analog GND**			
7	Analog In 1	Analog Out 1	-	-
8	Analog In 3	-	-	-
9	Digital In 1	Digital Out 1[1]	Digital Out 1[2]	-
10	Digital In 3	Digital Out 3[1]	Digital Out 3[2]	-
11	Digital In 5	Digital Out 4b[3]	-	-
12	Digital In 7	Digital Out 5b[3]	-	-
13	**Digital GND**			
14	Analog In 0	Analog Out 0	-	-
15	Analog In 2	-	-	-

1) Push-Pull
2) Open Collector
3) a/b line: switched by PhotoMOS relais, external signal at a is switched to b.

5.1.8 Technical Data



Note

The values are absolute maximums and must not be exceeded. All voltages are defined with respect to pin AGND or DGND unless otherwise specified. Positive current flows into the device.

Supply voltage	By base unit

Digital Inputs	
Number	8x with variable switching threshold and fixed switching hysteresis.
Input voltage	0 V ... 36 V
Threshold	0 V ... 20 V
Switching hysteresis	1000 mV ± 10 %
Input resistance	1.33 Mohm

Digital Outputs	
Number	6
Output voltage	Push-Pull: 5 V or 12 V (for all digital outputs collectively) OC: 0 V ... 36 V MOS switch: -36 V ... +36 V
Current carrying capacity at inactive analog outputs	Push: max. 80 mA at 5 V or max. 24 mA at 12 V (for all digital outputs collectively) OC/Pull:100 mA MOS switch:450 mA
Protection circuit	Push: Current monitoring circuit on overload OC/Pull: Short circuit by self-resetting fuse MOS switch: Short circuit by self-resetting fuse
On resistance	External signals: max. 2.5 ohm (MOS)
Output capacitance	External signals: 1.5 pF (MOS)
Switching time	typ. activation delay: 630 µs (3 ms max) typ. deactivation delay: 100 µs at 25 °C

Analog Inputs	
Number of inputs	4 single-ended
Measurement range	Single-ended: 0 V ... 36 V
Input resistance	AIN0, AIN1: 48 kohm AIN2, AIN3: 1 Mohm
Resolution	12 bit
Accuracy	1.3% of the measured value +/- 33 mV
Sampling rate	Max. 1 kHz

Analog Outputs	
Number of outputs	2
Voltage range	0 V ... 12 V
Accuracy	2 %
Resolution	12 bit
Conversion time	9 µs
Current carrying capacity at inactive digital outputs	Max. 10 mA at 5 V and 6 mA at 12 V
Output resistance	~ 290 ohm

PWM Outputs (PWM0 / PWM1)	
Number of outputs	2, both with the same frequency and with variable duty cycles
Frequency range	0.02 Hz ... 20 kHz at 8 bit
Resolution	8 bit
Levels	Low: 0 V High: 5 V or 12 V (collectively with digital outputs)
Current carrying capacity	**PWM0** Push: max. 80 mA at 5 V or max. 24 mA at 12 V (for all digital outputs collectively) **PWM0/PWM1** Pull: max. 100 mA
Protection circuit	PWM0 Push: Current monitoring circuit on overload
Output resistance	< 100 ohm

PWM Input (PWM0)	
Number of inputs	1
Pulse / pause times	Min: 5 µs
Precision	±1%
Levels	LOW: 0 V ... < V_{HIGH} (0 V ... 0.7 V) HIGH: > V_{LOW} ... < V_{REF} (1.7 V ... 3.3 V)
Input voltage	0 V ... 36 V

5.2 VNpiggy30 IO 8644

5.2.1 General Information

Introduction

The VNpiggy30 IO 8644 is a plug-in board (piggyback) designed for measurements and outputs of digital or analog signals. This plug-in board can be used with the following Vector devices:

> **VN1670**
Measurement lines accessible on channel IO via D-SUB15HD connector.

Signal lines

The VNpiggy30 IO 8644 offers a total of thirteen signal lines. Depending on the configuration, the maximum selectable IO lines are:

> 8x digital input
> 6x digital output
> 4x analog input
> 4x analog output
> 2x PWM output
> 1x PWM input



Note

The lines may be operated as either input or output. Mixed operation of one line is not possible. Mixed configuration of different lines is allowed.

The configuration is performed in your measurement application (e. g. CANoe). You can define your own measurement condition there for each defined measurement group. When a condition is fulfilled, the related signal values of the measurement group are acquired and passed to the application.

Measurement Group Digital	Measurement Group Analog	Measurement Group PWM
Digital In 0...7	Analog In 0...3	Capture
↯Measurement Condition	↯Measurement Condition	↯Measurement Condition

The following measurement conditions are available for selection:

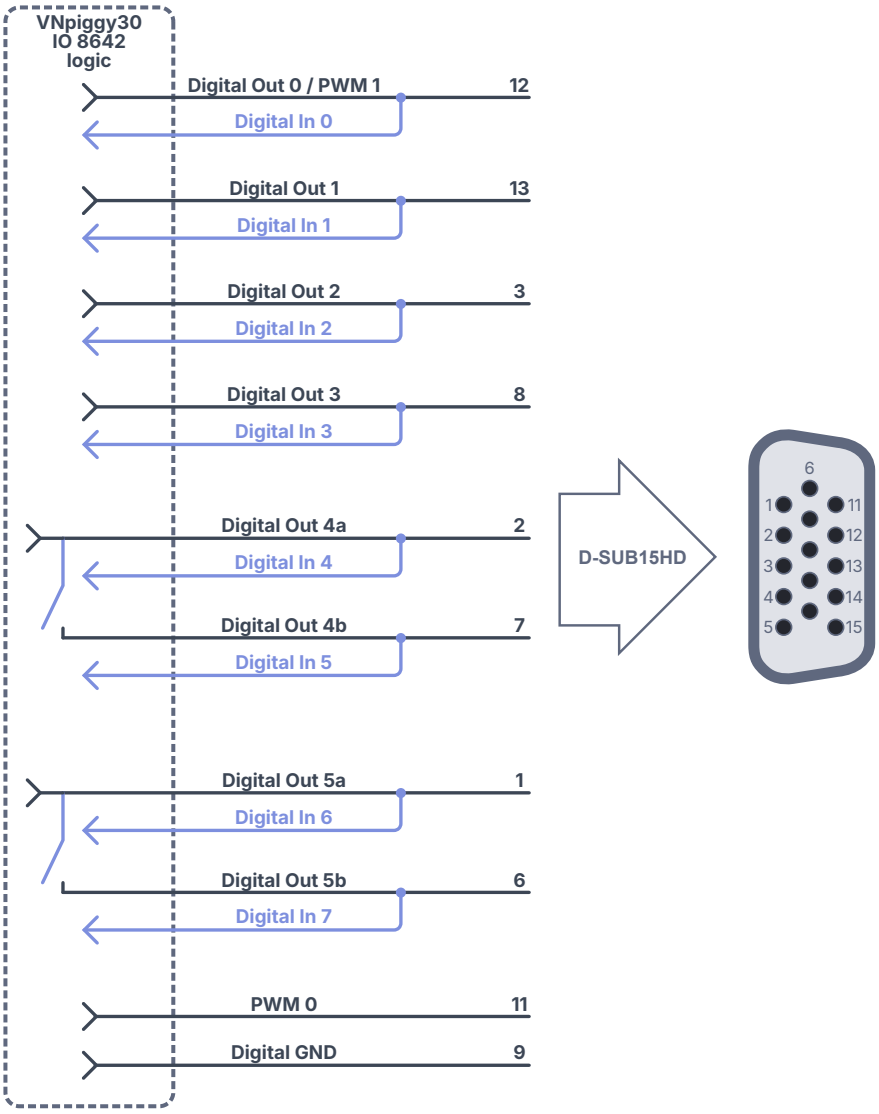
> Cyclic measurement
> Measurement by level changes (trigger)
(High → Low and Low → High) at the digital inputs

5.2.2 Digital Inputs and Outputs

Description

All digital signal lines can be used as either an input or output. This can be configured in the measurement application (e. g. CANoe). The following diagram illustrates the switching logic:

Switching logic for digital signals



Inputs

The switching threshold can be defined over a range of 1 V ... 36 V for all eight digital inputs (Digital In 0...7) with a constant hysteresis of 1 V.

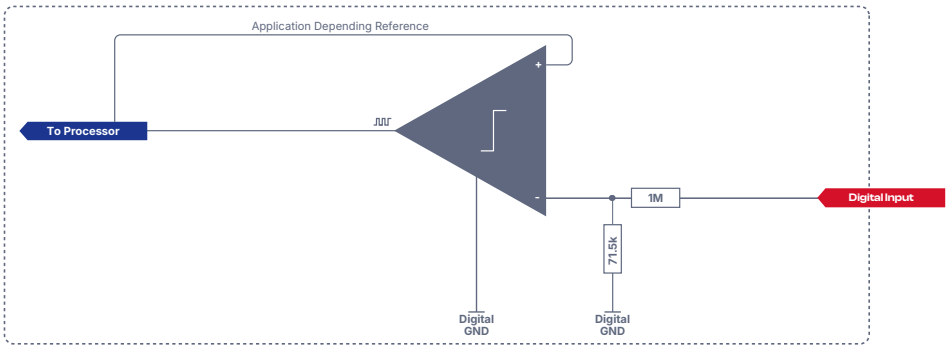


Figure 18: Digital input

Outputs

You can operate the digital outputs in three different modes. They are configured in your measurement application.

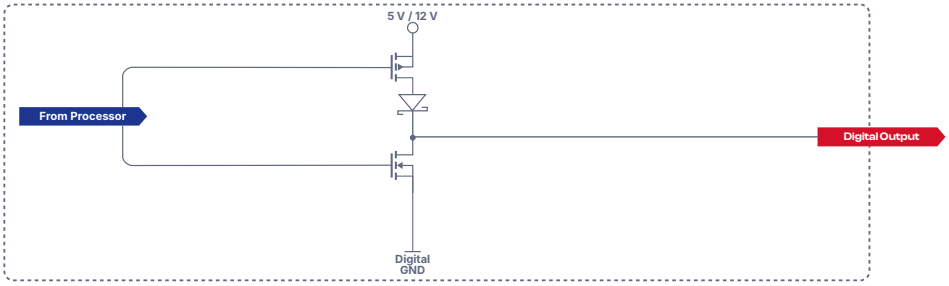


Figure 19: Digital output

- **Push-Pull (only Digital Out 0...3)**
  The LOW state corresponds to digital GND, and the HIGH state corresponds to the internal output voltage defined (by software). To prevent short circuits, you should never interconnect two push-pull outputs. Since the push driver loads the internal supply, the push output delivers less current than the pull input can take.
- **Open-Collector (only Digital Out 0...3)**
  The LOW state corresponds to digital GND, and the HIGH state corresponds to the external voltage applied via a pull-up resistor (current rating see section Technical Data on page 99).
- **MOS switch (only Digital Out 4a/4b and 5a/5b)**
  Floating switch for switching external signals. The signals to be switched are connected to the a/b lines provided. Suitable for all signals between - 36 V and + 36 V.

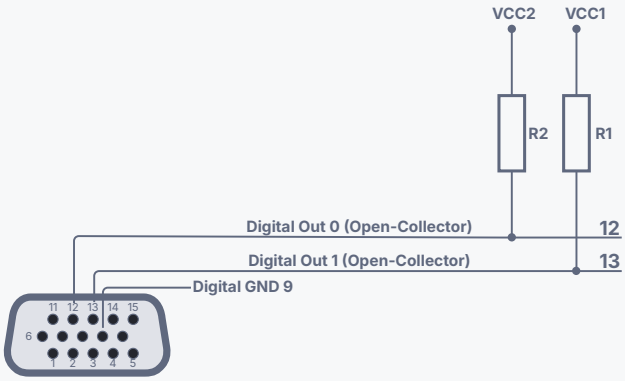
Note

The digital outputs 4a/4b and 5a/5b of the VNpiggy30 IO 8644 are implemented as switching outputs through PhotoMOS relays (switching time see section Technical Data on page 99). The limit frequency of the relays indicates the damping of the signal to be switched (the signal forms can be changed).

Example

Digital output in Open-Collector mode

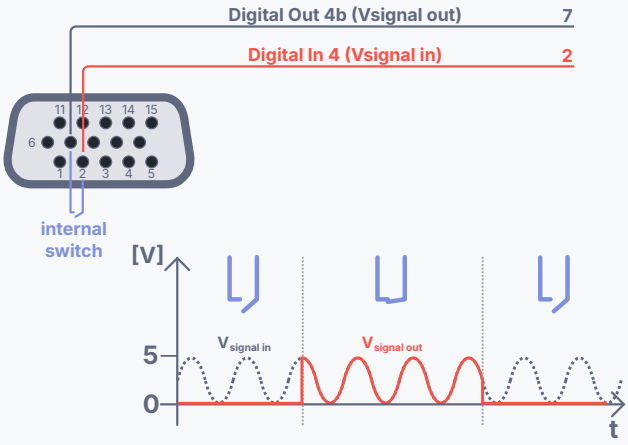
Digital Out 0 and 1 are configured as Open-Collector outputs. This requires a constant voltage to be applied via an external pull-up resistor. While LOW is defined with Digital GND, HIGH depends on the externally applied voltages.



Example

Digital output with external signal source

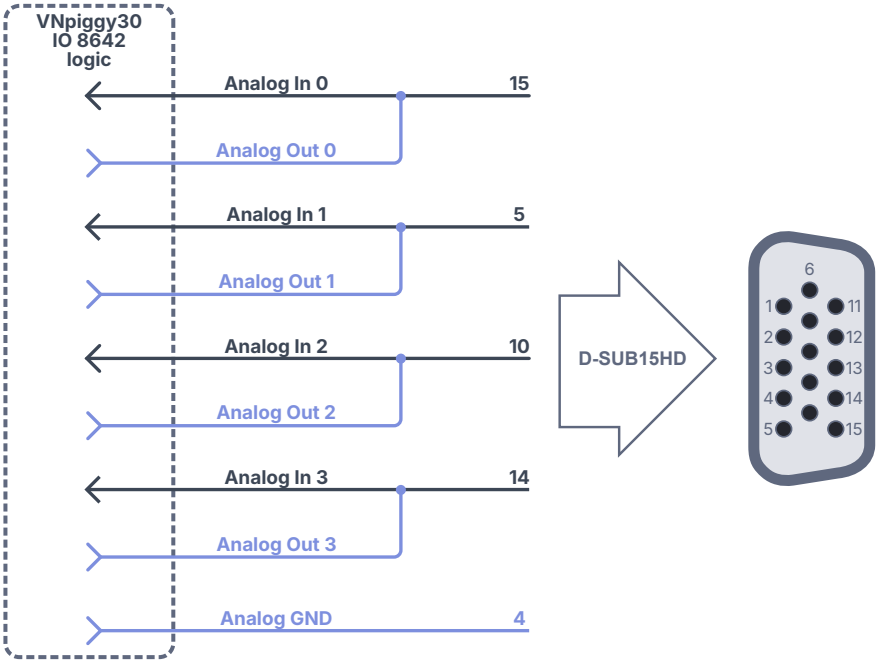
This example involves toggling a sinusoidal source voltage $V_{signal\ in}$ on and off arbitrarily. In the example, this is done by applying $V_{signal\ in}$ to Digital In 4. The voltages can now be toggled on and off at Digital Out 4b via the internal switch. The measurement application controls switching.



5.2.3 Analog Inputs and Outputs

Description

The VNpiggy30 IO 8644 has four analog inputs and outputs. They can be configured in the measurement application (e. g. CANoe). The following diagram illustrates the switching logic:



Inputs

You can operate the analog inputs in the following mode:

> **Single-Ended (Analog In 0 ... 3)**
The common reference potential for measurement of the voltages is Analog GND. Four independent signal lines are available for this.

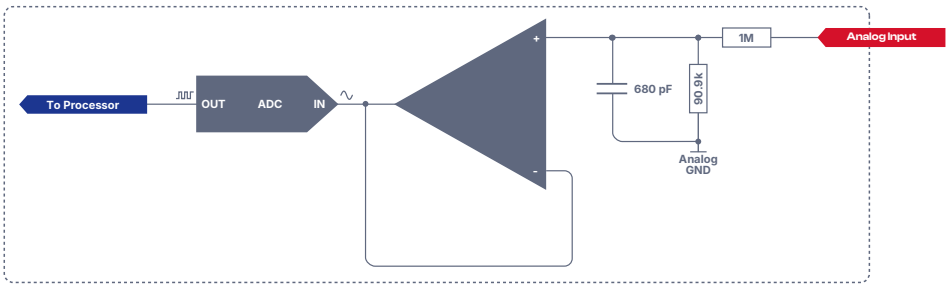


Figure 20: Analog input

Outputs

A voltage between 0 V and 12 V can be provided. An analog output can drive a maximum current of 10 mA (at 5 V) and 6 mA (at 12 V) respectively.

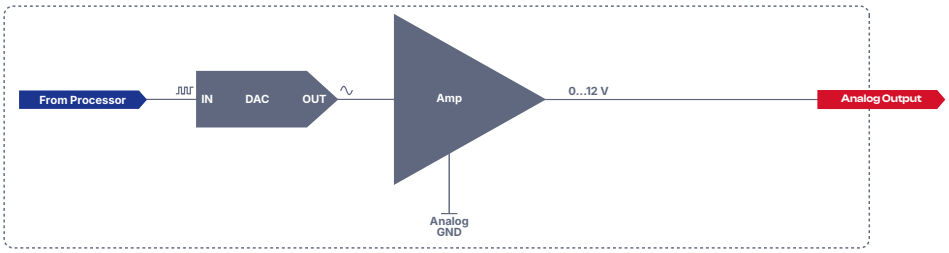


Figure 21: Analog output

5.2.4 PWM Outputs (PWM0/PWM1)

Description

The VNpiggy30 IO 8644 has PWM generators at pin 12 (PWM 1) and pin 11 (PWM 0) that can be operated at different frequencies. The configurable frequency range is between 0.02 Hz and 20 kHz. The two PWM duty cycles are configured in the measurement application and can be set independently from 0 % up to 100.0 %.

5.2.5 PWM Input (PWM0)

Description

You can use the PWM input to measure the duty cycle of a PWM signal.

The minimum pulse width is 1 µs. This yields a maximum input frequency of 100 kHz (at a 50 % duty cycle).

5.2.6 D-SUB15HD Pin Configuration Examples

The following table shows examples of different pin configurations defined in the measurement application (e. g. CANoe):

Pin	Config 1	Config 2	Config 3
1	Digital In 6	Digital Out 5a[3]	-
2	Digital In 4	Digital Out 4a[3]	-
3	Digital In 2	Digital Out 2[1]	Digital Out 2[2]
4	**Analog GND**		
5	Analog In 1	Analog Out 1	-
6	Digital In 7	Digital Out 5b[3]	-
7	Digital In 5	Digital Out 4b[3]	-
8	Digital In 3	Digital Out 3[1]	Digital Out 3[2]
9	**Digital GND**		
10	Analog In 2	-	-
11	PWM	-	-
12	Digital In 0	Digital Out 0[1]	Digital Out 0[2]
13	Digital In 1	Digital Out 1[1]	Digital Out 1[2]
14	Analog In 3	-	-
15	Analog In 0	Analog Out 0	-

1) Push-Pull
2) Open-Drain
3) a/b line: switched by PhotoMOS relais, external signal at a is switched to b.

5.2.7 Technical Data



Note

The values are absolute maximums and must not be exceeded. All voltages are defined with respect to pin AGND or DGND unless otherwise specified. Positive current flows into the device.

Although MOSFETs are used, the Open-Drain outputs are abbreviated as "OC" to facilitate comparison with the IOpiggy 8642.

Supply voltage	By base unit

Digital Inputs	
Number	8x with variable switching threshold and fixed switching hysteresis.
Input voltage	0 V ... 36 V
Threshold	1 V ... 36 V
Switching hysteresis	1000 mV ± 5%
Input resistance	>1 Mohm

Digital Outputs	
Number	6
Output voltage	Push-Pull: 5 V or 12 V (for all digital outputs collectively) OC: 0 V ... 36 V PhotoMOS switch: -36 V ... +36 V
Current carrying capacity	Push: max. 80 mA at 5 V or max. 24 mA at 12 V (for all digital outputs collectively) OC/Pull:100 mA MOS switch:450 mA
Protection circuit	Push: Current monitoring circuit on overload (20 mA per channel) OC/Pull: Short circuit by self-resetting fuse PhotoMOS switch: Short circuit by self-resetting fuse
On resistance	External signals: max. 2.5 ohm (MOS)
Output capacitance	External signals: 1.5 pF (MOS)
Switching time	typ. 630 µs (3 ms max.) typ. deactivation delay: 100 µs at 25 °C

Analog Inputs	
Number of inputs	4 single-ended
Measurement range	Single-ended: 0 V ... 36 V
Input resistance	AIN0 ... AIN3: >1 Mohm
Resolution	12 bit
Accuracy	typ. 0.07 % gain + 12 mV offset max. 0.25 % gain + 37 mV offset
3dB bandwidth	2 kHz

Analog Outputs	
Number of outputs	4
Voltage range	0 V ... 12 V
Accuracy	0.5 % gain +10 mV offset
Resolution	12 bit
Current carrying capacity	Max. 10 mA at 5 V and 6 mA at 12 V
Output resistance	Approx. 10 ohm

PWM Outputs (PWM0 / PWM1)	
Number of outputs	2x with independend frequencies and duty cycles
Frequency range	0.02 Hz ... 20 kHz, typ. in 0.01 kHz steps (depends on measurement application)
Duty cycle	0 % ... 100 %, typ. in 0.01 % steps (depends on measurement application)
Levels	Low: 0 V High: 5 V or 12 V (collectively with digital outputs)
Current carrying capacity	**PWM0** Push: max. 80 mA at 5 V or max. 24 mA at 12 V (for all digital outputs collectively) **PWM0/PWM1** Pull: max. 100 mA
Protection circuit	PWM0 Push: Current monitoring circuit on overload

PWM Input (PWM0)	
Number of inputs	1
Pulse / pause times	Min: 5 µs
Precision	±1%
Levels	LOW: 0 V ... < V_{HIGH} (0 V ... 0.7 V) HIGH: > V_{LOW} ... < V_{REF} (1.7 V ... 3.3 V)
Input voltage	0 V ... 36 V

6 Cables and Connectors

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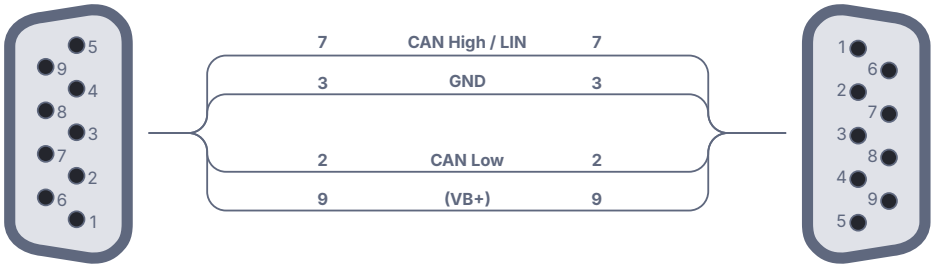
6.1 CAN/LIN

6.1.1 CANcable0

Low-speed cable

Description	CAN/LIN connection cable **Note** When using with devices that have a primary and a secondary D-SUB9 pin assignment, only the primary channel is accessible.
Length	0.3 m
Connectors	2x female D-SUB9 connectors
Temp. range	Fixed installation: -30 °C ...+80 °C Flexible use: -10 °C ...+80 °C
Min. bending radius	Fixed installation: 21 mm Flexible use: 42 mm
Properties	Without terminating resistors
Part number	05002

Setup

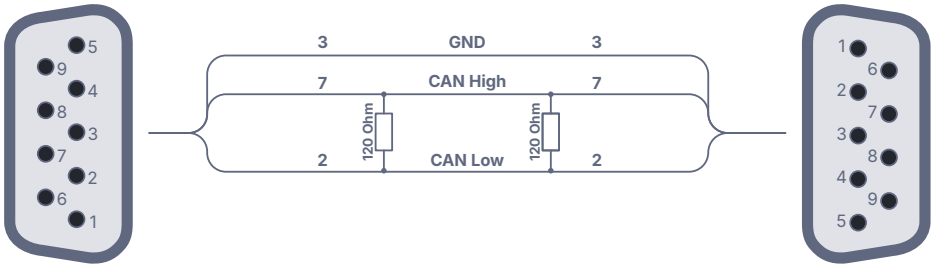


6.1.2 CANcable1

High-speed cable

Description	CAN connection cable **Note** When using with devices that have a primary and a secondary D-SUB9 pin assignment, only the primary channel is accessible.
Length	0.3 m
Connectors	2x female D-SUB9 connectors
Temp. range	Fixed installation: -30 °C ...+80 °C Flexible use: -10 °C ...+80 °C
Min. bending radius	Fixed installation: 21 mm Flexible use: 42 mm
Properties	Two parallel 120 ohm terminating resistors
Part number	05001

Setup



6.1.3 CANcableA

All-purpose cable

Description	CAN/LIN connection cable
Length	0.5 m
Connectors	1x female D-SUB9 connector 4x stripped wires
Temp. range	Fixed installation: -30 °C ...+80 °C Flexible use: -10 °C ...+80 °C
Min. bending radius	Fixed installation: 21 mm Flexible use: 42 mm
Part number	Included in CANcable Set Pro (part number 05060)

Pin	Assignment	Wire
2	CAN Low	Green
3	VB-	Black
7	CAN High / LIN	Yellow
9	VB+	Red

6.1.4 CANcable TnT (D-SUB9 to Bunch Plugs)

Misc. CAN

Description	Connection for: > CAN 2.0, CAN FD, CAN SIC > Truck & Trailer CAN (ISO 11992)
Length	1.5 m
Connectors	1x female D-SUB9 connector 4x bunch plug
Temp. range	Fixed installation: -25 °C ...+70 °C Flexible use: -5 °C ...+70 °C
Min. bending radius	Fixed installation: 22.4 mm Flexible use: 56.0 mm
Properties	Without terminating resistor
Part number	05016

Pin	Assignment	Bunch Plug
2	CAN Low	Green
3	VB-	Blue
7	CAN High	Yellow
9	VS	Red

6.1.5 CANcable TnT Term

Truck & Trailer CAN

Description	Connection cable for Truck & Trailer (ISO 11992)
Length	1.5 m
Connectors	1x female D-SUB9 connector 4x bunch plugs
Temp. range	Fixed installation: -25 °C ...+70 °C Flexible use: -5 °C ...+70 °C
Min. bending radius	Fixed installation: 22.4 mm Flexible use: 56.0 mm
Properties	With terminating resistors
Part number	05015

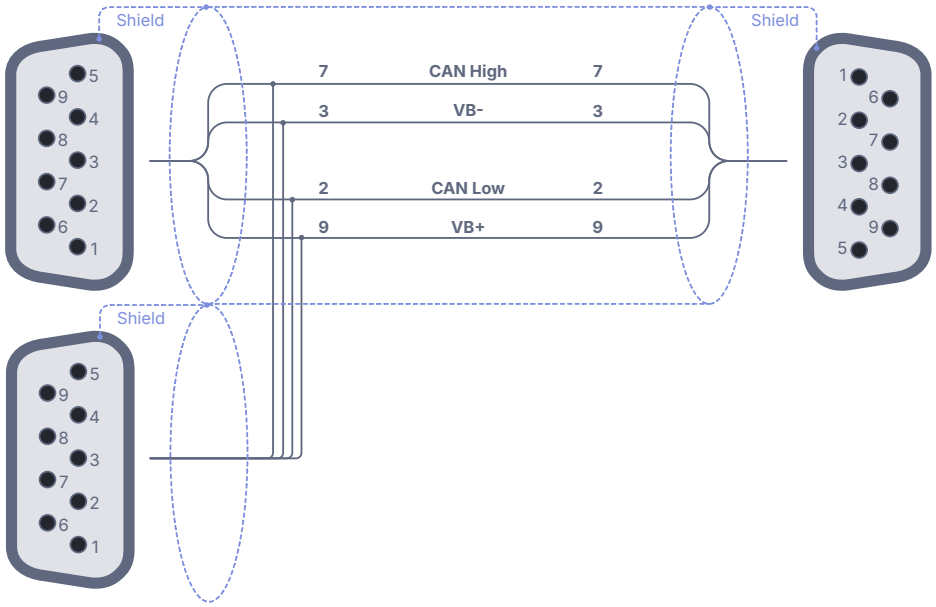
Pin	Assignment	Bunch Plug
2	CAN Low	Green
3	VB-	Blue
7	CAN High	Yellow
9	VS	Red

6.1.6 CANcableY

Extension cable

Description	Y extension cable for CAN or LIN
Length	2 m (overall length)
Connectors	3x female D-SUB9 connectors
Temp. range	Fixed installation: -30 °C ...+80 °C Flexible use: -10 °C ...+80 °C
Min. bending radius	Fixed installation: 21 mm Flexible use: 42 mm
Properties	Including gender changer
Part number	Included in CANcable Set Pro (part number 05060)

Setup

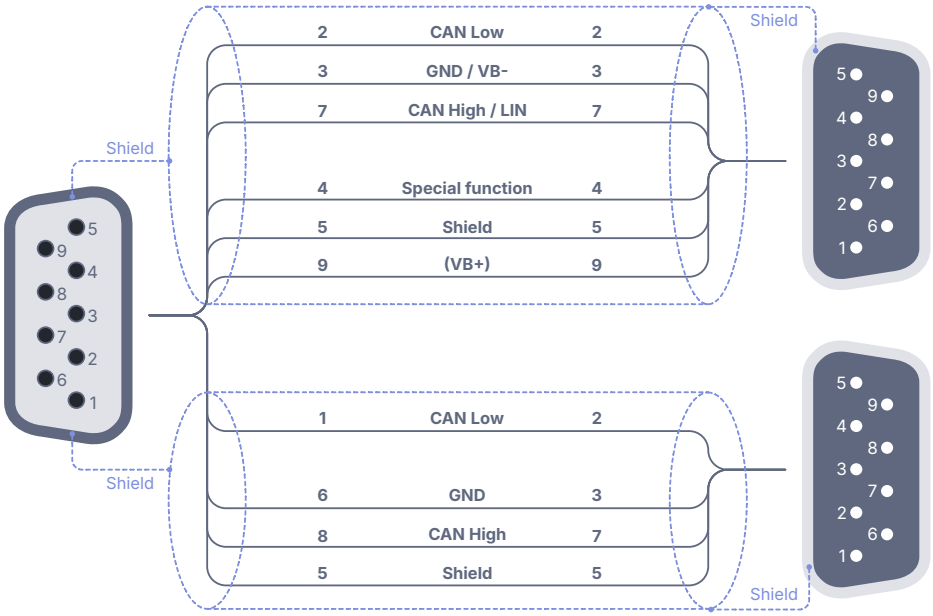


6.1.7 CANcable 2Y

Y cable

Description	Y cable for Vector CAN/CAN-FD/CAN SIC/LIN interfaces with D-SUB9 double assignment (VN1600 interface family, VN8970 etc.). Splits the double assignment into two separate D-SUB9 connectors (CH A and CH B). Examples: > **VN1610** CH1/2 → Channel 1 (CH A) and 2 (CH B) > **VN1630** CH1/3 → Channel 1 (CH A) and 3 (CH B) CH2/4 → Channel 2 (CH A) and 4 (CH B) > **VN8970** CH1/5 → Channel 1 (CH A) and 5 (CH B) CH2/6 → Channel 2 (CH A) and 6 (CH B) CH3/7 → Channel 3 (CH A) and 7 (CH B) CH4/8 → Channel 4 (CH A) and 8 (CH B) The pin assignments of the D-SUB9 connectors CH A and CH B depend on the used bus transceivers inside the interface (see section D-SUB Pin Assignment on page 48).
Length	0.3 m
Connectors	1x female D-SUB9 connector 2x male D-SUB9 connectors
Temp. range	Fixed installation: -30 °C ...+80 °C Flexible use: -10 °C ...+80 °C
Min. bending radius	Fixed installation: 27.5 mm Flexible use: 55.0 mm
Part number	05075

Setup

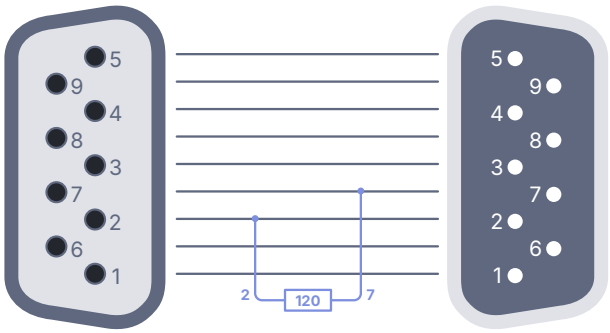

Shield
2 CAN Low 2
3 GND / VB- 3
7 CAN High / LIN 7
4 Special function 4
5 Shield 5
9 (VB+) 9
Shield
1 CAN Low 2
6 GND 3
8 CAN High 7
5 Shield 5
Shield
Shield
5 9 4 8 3 7 2 6 1
5 9 4 8 3 7 2 6 1
5 9 4 8 3 7 2 6 1

6.1.8 CANterm 120

Terminating resistor

Description	CAN adapter for high-speed CAN buses **Note** When using with devices that have a primary and a secondary D-SUB9 pin assignment, only the primary channel is accessible.
Rated voltage	300 V
Operating temp.	-25 °C ... +105 °C
Connectors	1x female D-SUB9 connector 1x male D-SUB9 connector
Properties	One 120 ohm terminating resistor
Part number	05004

Setup



6.1.9 CANcable Set Pro

Description	Cable set for CAN/LIN incl.: > 1x CANcable0 > 1x CANcableY > 2x CANcableA > 2x CANterm 120 > 2x Gender changer male/male > 1x Gender changer female/female
Temp. range	Fixed installation: -30 °C ...+80 °C Flexible use: -10 °C ...+80 °C
Min. bending radius	Fixed installation: 21 mm Flexible use: 42 mm
Part number	05060

6.2 Ethernet

6.2.1 AEcable 2Y Family

6.2.1.1 General Information

Connection cable

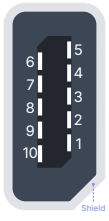
Description	Connection cable for 1000BASE-T1 and 100BASE-T1 Ethernet network interfaces with an ix connector, a splitter box and different ends for multiple use cases (see section Connector Options on page 115). The splitter box separates the two Ethernet channels into two separate cables. The shieldings of CHA and CHB are connected to each other, but are electrically isolated from the shield of the network interface via capacitors.
Length	approx. 1.8 m*
Rated voltage	30 V (HV test: 300 V / 0.01 s)
Connectors	1x ix connector (type A, 10 pole, male) Harting: 09 45 181 2561 XL / Hirose IX30G-A-10S-CV(7.0)

* exceptions see section Connector Options on page 115

AEcable 2Y with H-MTD Z connectors



Pin	Assignment
1	CHB MDI+
2	CHB MDI-
3...5	Not connected
6	CHA MDI+
7	CHA MDI-
8...10	Not connected
Shield	Shield



6.2.1.2 Connector Options

Overview

The following table shows an overview of the available connectors for the AEcable 2Y:

AEcable 2Y	Connectors	Part no.
EVA	2x open end > Single strand cross section 0.14 mm² > (seven tinned copper wires) > Outer diameter one conductor: about 1.23 mm > Outer diameter cable: about 3.8 mm > Similar to LEONI Dacar 686-3 or > Gebauer&Griller 2Speed 251 Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C > Cable: white (MDI+) / green (MDI-)	05124
EVA 10m	2x open end > Cable length: 10 m > Single strand cross section 0.14 mm² > (seven tinned copper wires) > Outer diameter one conductor: about 1.23 mm > Outer diameter cable: about 3.8 mm > Similar to LEONI Dacar 686-3 or > Gebauer&Griller 2Speed 251 Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C > Cable: white (MDI+) / green (MDI-)	05211
H-MTD Zjp	1x H-MTD, coding Z, type jack > Manufacturer part number: Rosenberger E6K10A-1CAZ5-Z > 1x H-MTD, coding Z, type plug > Manufacturer part number: Rosenberger E6S10A-1CAZ5-Z Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05134
H-MTD Zjj	2x H-MTD, coding Z, type jack > Manufacturer part number: Rosenberger E6K10A-1CAZ5-Z Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm	05133

AEcable 2Y	Connectors	Part no.
	> Max. operating temp.: 75 °C	
H-MTD Zpp	2x H-MTD, coding Z, type plug > Manufacturer part number: Rosenberger E6S10A-1CAZ5-Z Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05135
HSD Zjp	1x HSD, coding Z, type jack > Manufacturer part number: Rosenberger D4K10A-1D5A5-Z 1x HSD, coding Z, type plug > Manufacturer part number: Rosenberger D4S10A-1D5A5-Z	05126
HSD Zjj	2x HSD, coding Z, type jack > Manufacturer part number: Rosenberger D4K10A-1D5A5-Z Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05128
HSD Zpp	2x HSD, coding Z, type plug > Manufacturer part number: Rosenberger D4S10A-1D5A5-Z Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05129
MATEnet Zfh	1x MATEnet, coding Z, type frame > Manufacturer part number: TE (Tyco Electronics, TE Connectivity) – 1-1703930-1 MATEnet NanoMQS Receptacle Terminal – 1-2302450-1 MATEnet female insert modul – 2302454-9 MATEnet 1-port Frame UTP Z-Coding 1x MATEnet, coding Z, type header > Manufacturer part number: TE (Tyco Electronics, TE Connectivity) – 2236905-1 MATEnet Nano TAB 0.5x0.4 Terminal – 2302451-1 MATEnet male insert modul – 4-2302461-9 MATEnet 1-port Inline Coupler Z-Coding Technical data > Rated voltage: 30 V	05137

AEcable 2Y	Connectors	Part no.
	> Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	
MATEnet Zff	2x MATEnet, coding Z, type frame > Manufacturer part number: – TE (Tyco Electronics, TE Connectivity) – 1-1703930-1 MATEnet NanoMQS Receptacle Terminal – 1-2302450-1 MATEnet female insert modul – 2302454-9 MATEnet 1-port Frame UTP Z-Coding Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05138
MATEnet Zhh	2x MATEnet, coding Z, type header > Manufacturer part number: – TE (Tyco Electronics, TE Connectivity) – 2236905-1 MATEnet Nano TAB 0.5x0.4 Terminal – 2302451-1 MATEnet male insert modul – 4-2302461-9 MATEnet 1-port Inline Coupler Z-Coding Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05136
DSUB9 male	2x D-SUB9, type male Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05119
RJ45pp	2x RJ45, type plug Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05131
RJ45jj	2x RJ45, type jack Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm > Max. operating temp.: 75 °C	05130
RJ45jp	1x RJ45, type plug 1x RJ45, type jack Technical data > Rated voltage: 30 V > Min. bending radius: 37.2 mm	05132

AEcable 2Y	Connectors	Part no.
	> Max. operating temp.: 75 °C	

H-MTD Z connectors



Figure 22: Jack



Figure 23: Plug

HSD Z connectors

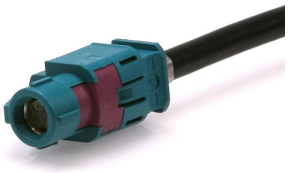


Figure 24: Jack



Figure 25: Plug

MATEnet Zconnectors

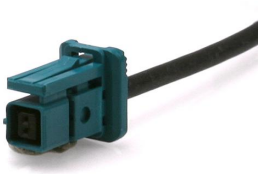


Figure 26: Frame

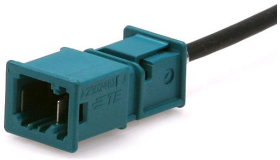


Figure 27: Header

D-SUB9 / RJ45 connectors



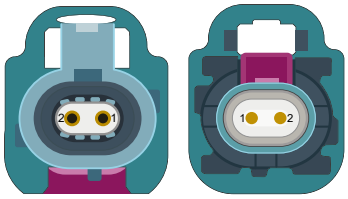
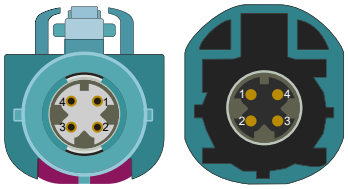
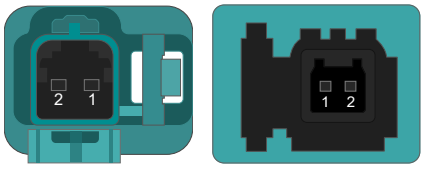
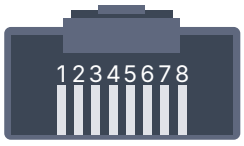
Figure 28: D-SUB 9 (plug)



Figure 29: RJ45 (plug)

Pin assignment

The following table shows the pin assignment depending on the connector type:

Connector Type	Ethernet MDI+	Ethernet MDI-
H-MTD Z  jack / plug	Pin 1	Pin 2
HSD Z  jack / plug	Pin 2	Pin 3
MATEnet Z  frame / header	Pin 1	Pin 2
D-SUB9 (2x) (one MDI channel at each connector) 	Pin 4	Pin 5
RJ45 	Pin 1	Pin 2

EVA

Color	Assignment
White	MDI+
Green	MDI-

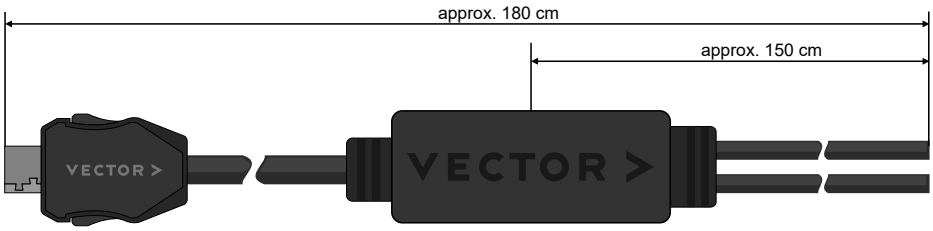
Note

Please note that the AEcable 2Y DSUB9 male is intended for use with 100BASE-T1 only. All other cables are intended for 1000BASE-T1 and 100BASE-T1.

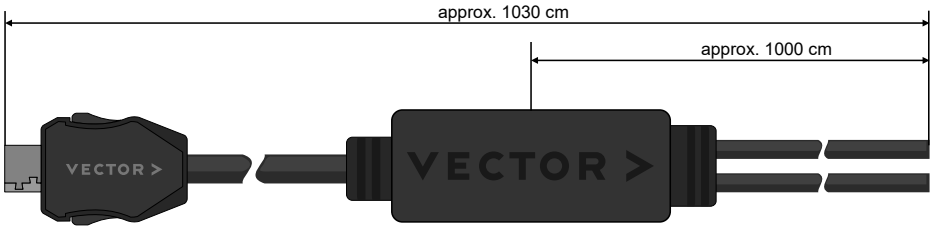
Cable length

The cable lengths vary depending on the cable option. The length of the H-MTD, HSD, MATEnet, D-SUB or RJ45 connector will increase the overall length accordingly.

AEcable 2Y EVA



AEcable 2Y EVA 10m



6.2.2 AEcable MultiGig Family

6.2.2.1 General Information

Connection cable

Description	Connection cable for MultiGBASE-T1 Automotive Ethernet network interfaces. With a high-speed capable connector and different ends for multiple use cases (see section Connector Options on page 122).
Length	approx. 1.8 m*
Minimum bending radius	> Fixed installation: 12 mm (3x outer diameter, outer diameter: 4 mm) > Flexible use: 40 mm (10x outer diameter, outer diameter: 4 mm)
Connectors	1x Yamaichi YCP-BPR09ACX-S1MSCDX-041B

* exceptions see section Connector Options on page 122

AEcable MultiGig with H-MTD Z connectors



YCP Pin	H-MTD Pin
1	1
2	2
Shield	Shield



6.2.2.2 Connector Options

Overview

The following table shows an overview of the available connectors for the AEcable MultiGig:

AEcable MultiGig	Connectors	Part no.
EVA	Open end > Single strand cross section 0.14 mm² (seven tinned copper wires) > Outer diameter one conductor: approx. 1.23 mm > Outer diameter cable: approx. 3.8 mm > Similar to Gebauer&Griller 2Speed 251 > Cable: white (MDI+) / green (MDI-)	05218
H-MTD Zj	H-MTD, coding Z, type jack > Manufacturer part number: Rosenberger E6K10A-1CAZ5-Z	05216
H-MTD Zp	H-MTD, coding Z, type plug > Manufacturer part number: Rosenberger E6S10A-1CAZ5-Z	05217

H-MTD Z connectors



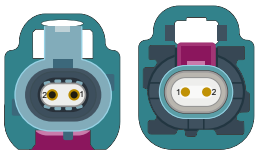
Figure 30: Jack



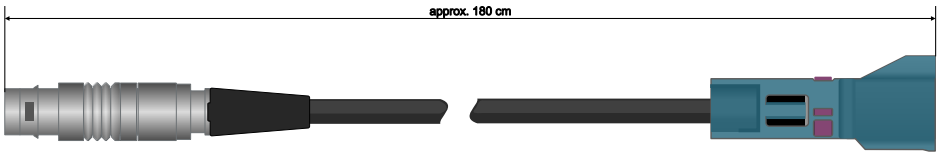
Figure 31: Plug

Pin assignment

The following table shows the pin assignment depending on the connector type:

Connector Type	Ethernet MDI+	Ethernet MDI-
H-MTD Z  jack / plug	Pin 1	Pin 2

Cable length



6.2.3 AEcable ix/DSUB9 Family

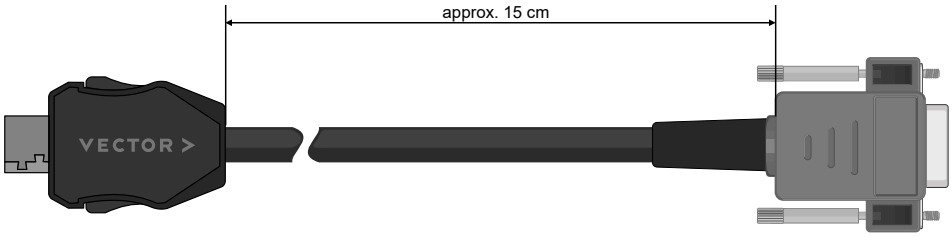
6.2.3.1 AEcable ix/DSUB9 100BASE-T1

Connection cable

Description	Connection cable with an ix and a D-SUB9 connector for 100BASE-T1 Ethernet networks. The D-SUB9 connector provides two Ethernet channels (CHA and CHB). The shields of the ix connector and the D-SUB9 connector are **not** linked via the cable shield.
Length	approx. 15 cm between the connectors
Minimum bending radius	32.5 mm (5x outer diameter, outer diameter: 6.5 mm)
Connectors	1x ix connector (type A, 10 pole, male) Harting: 09 45 181 2561 XL / Hirose IX30G-A-10S-CV(7.0) 1x D-SUB9 (male)
Part number	05214

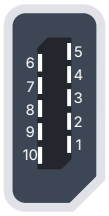


Cable length

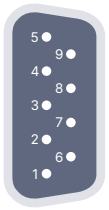


iX Pin	Assignment	D-SUB9 Pin
6	CHA MDI+	4
7	CHA MDI-	5
1	CHB MDI+	1
2	CHB MDI-	2

Pin	Assignment
1	CH2 MDI+
2	CH2 MDI-
3...5	Not connected
6	CH1 MDI+
7	CH1 MDI-
8...10	Not connected
Shield	Shield

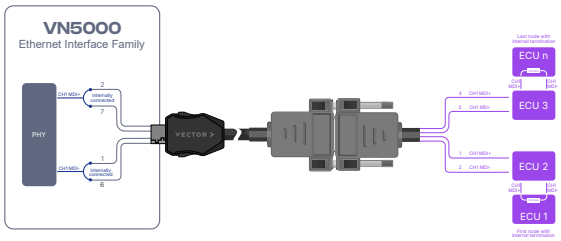


Pin	Assignment
1	CHB MDI+
2	CHB MDI-
3	Not connected
4	CHA MDI+
5	CHA MDI-
6...9	Not connected
Shield	Shield



6.2.3.2 AEcable ix/DSUB9 10BASE-T1S

Connection cable

Description	Connection cable with one ix and one D-SUB9 connector for 10BASE-T1S Ethernet networks. The shields of the ix connector and the D-SUB9 connector are **linked** via the cable shield. When used in a multidrop busline setup, one 10BASE-T1S channel is available. The channel consists of two twisted pairs, leading the multidrop bus line into the device to the 10BASE-T1S PHY. At the PHY, the two pairs are connected to each other and to the PHY to keep the stub as short as possible.  The cable is intended for use with VN56xx and other devices for 10BASE-T1S with single assigned ix connectors. Use in other networks must be checked on a case-by-case basis.
Length	approx. 15 cm between the connectors
Minimum bending radius	32.5 mm (5x outer diameter, outer diameter: 6.5 mm)
Connectors	1x ix connector (type A, 10 pole, male) Harting: 09 45 181 2561 XL / Hirose IX30G-A-10S-CV(7.0) 1x D-SUB9 (male)
Part number	05219

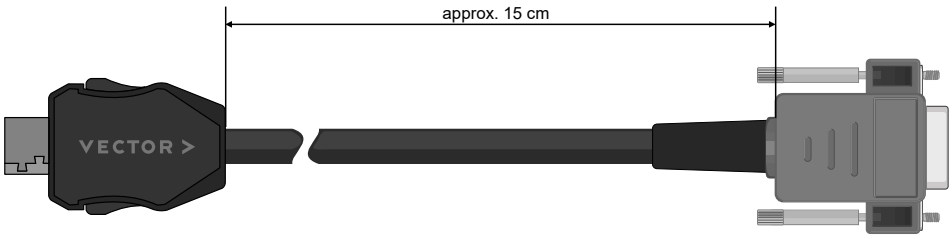
Note

When using the AEcable ix/DSUB9 10BASE-T1S, the multidrop bus line is extended by 2x 15 cm, i. e. approx. 30 cm.

If no network interface is connected, the multidrop bus line is interrupted.

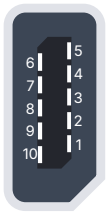


Cable length

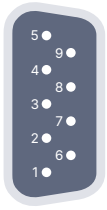


iX Pin	Assignment	D-SUB9 Pin
6	CH1 MDI+ (connected to pin 1)	4
7	CH1 MDI- (connected to pin 2)	5
1	CH1 MDI+ (connected to pin 6)	1
2	CH1 MDI- (connected to pin 7)	2
Shield	Shield	Shield

Pin	Assignment
1	CH1 MDI+ (connected to pin 6)
2	CH1 MDI- (connected to pin 7)
3...5	Not connected
6	CH1 MDI+ (connected to pin 1)
7	CH1 MDI- (connected to pin 2)
8...10	Not connected
Shield	Shield



Pin	Assignment
1	CH1 MDI+ (connected to pin 6)
2	CH1 MDI- (connected to pin 7)
3	Not connected
4	CH1 MDI+ (connected to pin 1)
5	CH1 MDI- (connected to pin 2)
6...9	Not connected
Shield	Shield



6.2.3.3 AEcable 2Y DSUB9 10BASE-T1S

Connection cable

Description	Connection cable with one ix and two D-SUB9 connectors for 10BASE-T1S Ethernet networks. The shields of the ix connector and the D-SUB9 connectors are **linked** via the cable shield. When used in a multidrop bus line setup, two 10BASE-T1S channels are available. Each channel consists of two twisted pairs, leading the multidrop bus line into the device to the 10BASE-T1S PHY. At the PHY, the two pairs are connected to each other and to the PHY to keep the stub as short as possible. The cable is intended for use with VN5614 and other devices for 10BASE-T1S with double assigned ix connectors. Use in other networks must be checked on a case-by-case basis.
Length	approx. 15 cm (overall)
Rated voltage	30 V
HV test	300 V (0.01 s)
Connectors	1x ix connector (type A, 10 pole, male) Harting: 09 45 181 2561 XL / Hirose IX30G-A-10S-CV(7.0) 2x D-SUB9 (male)
Part number	05246

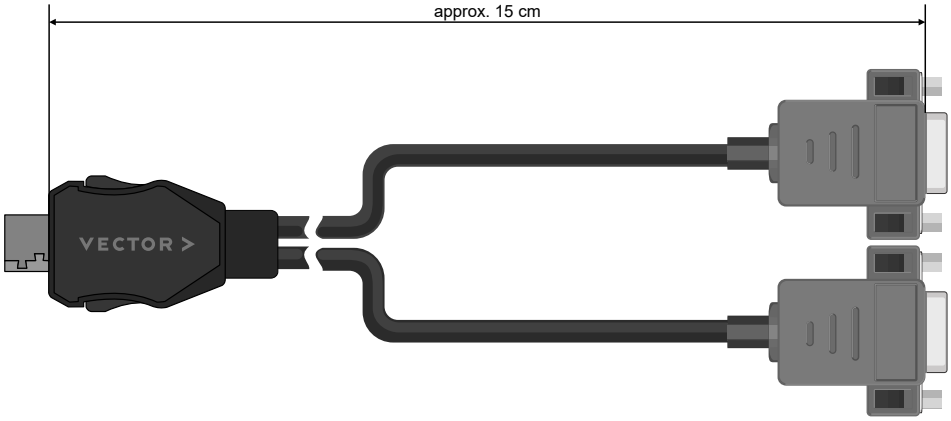
Note

When using the AEcable 2Y DSUB9 10BASE-T1S, the multidrop bus line is extended by 2x 15 cm, i. e. approx. 30 cm.

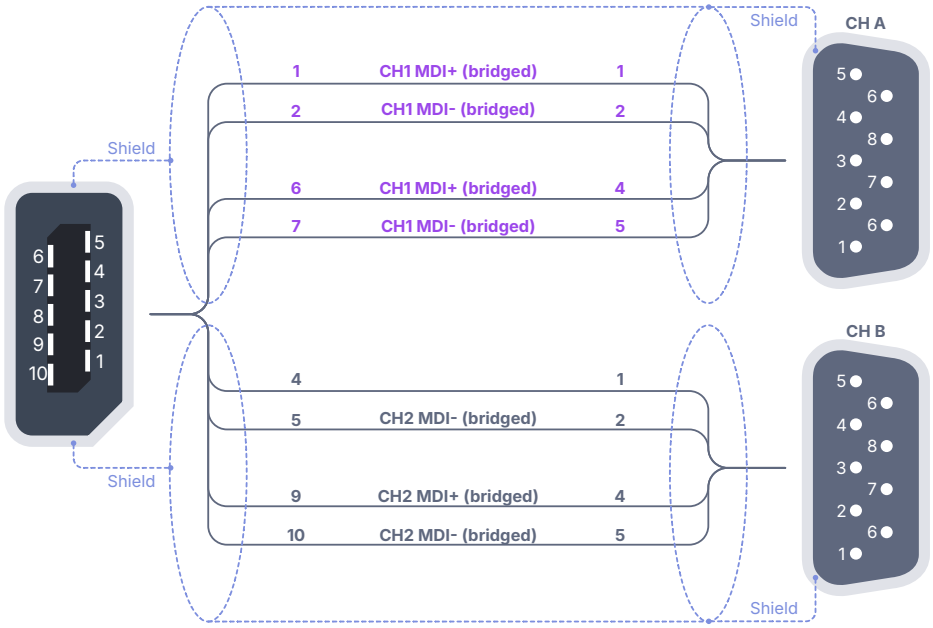
If no network interface is connected, the multidrop bus line is interrupted.



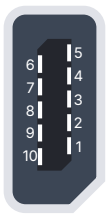
Cable length



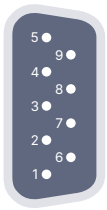
Setup



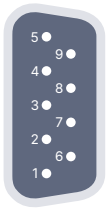
Pin	Assignment
1	CH1 MDI+ (connected to pin 6)
2	CH1 MDI- (connected to pin 7)
6	CH1 MDI+ (connected to pin 1)
7	CH1 MDI- (connected to pin 2)
4	CH2 MDI+ (connected to pin 9)
5	CH2 MDI- (connected to pin 10)
9	CH2 MDI- (connected to pin 4)
10	CH2 MDI- (connected to pin 5)
Shield	Shield



Pin	Assignment (Channel A)
1	CH1 MDI+ (connected to pin 4)
2	CH1 MDI- (connected to pin 5)
3	Not connected
4	CH1 MDI+ (connected to pin 1)
5	CH1 MDI- (connected to pin 2)
6...9	Not connected
Shield	Shield



Pin	Assignment (Channel B)
1	CH2 MDI+ (connected to pin 4)
2	CH2 MDI- (connected to pin 5)
3	Not connected
4	CH2 MDI+ (connected to pin 1)
5	CH2 MDI- (connected to pin 2)
6...9	Not connected
Shield	Shield

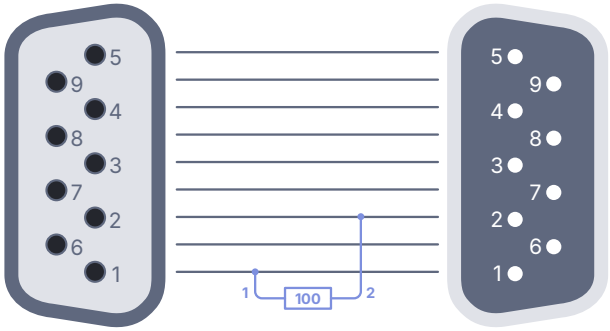


6.2.4 10BASEterm

Terminating resistor

Description	Adapter to terminate 10BASE-T1S networks. **Note** > The termination resistor is connected to CHB (pin 1 and pin 2) when used with AEcable ix/DSUB9 10BASE-T1S. CHA (pin 4 and pin 5) shall be connected to the multidrop busline. > The 10BASEterm ist not intended for use with AEcable 2Y DSUB9 male.
Connectors	1x female D-SUB9 connector 1x male D-SUB9 connector
Rated voltage	300 V
Operating temp.	-25 °C ... +105 °C
Properties	One 100 ohm terminating resistor
Part number	05224

Setup

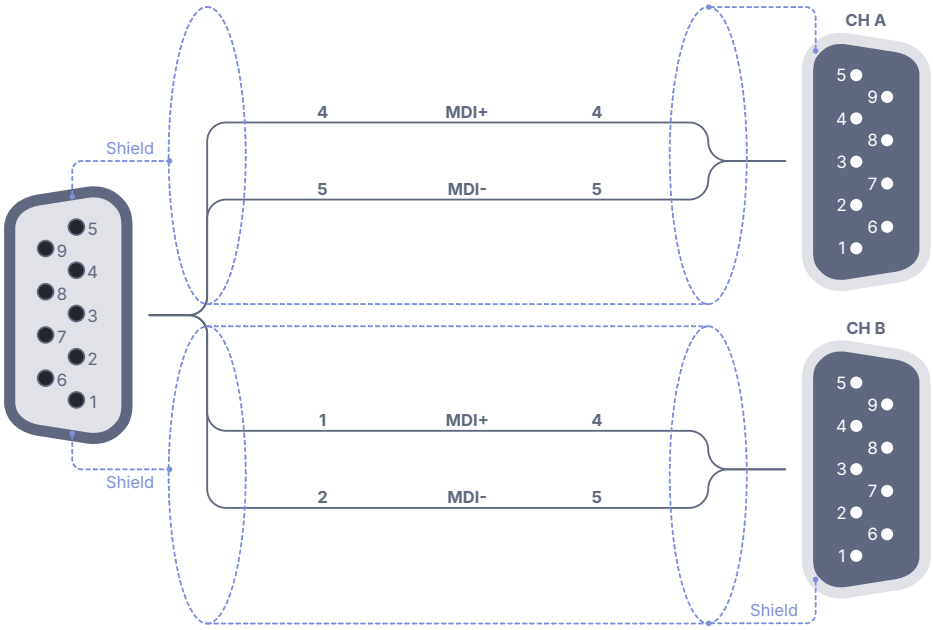


6.2.5 BRcable 2Y

Y cable

Description	Y cable for VN5600 interfaces with D-SUB9 double assignment. Splits the double assignment into two separate D-SUB9 connectors (CH A and CH B), each with a separate BroadR-Reach channel.
Length	0.36 m (overall length)
Connectors	1x female D-SUB9 connector 2x male D-SUB9 connectors
Part number	05103

Setup



6.2.6 VNcable D-SUB9 HSD Z Male

Connection cable

Description	Connection cable for BroadR-Reach Ethernet network interfaces
Length	approx. 50 cm
Connectors	1x Rosenberger HSD Z (male) 1x D-SUB9 (female)
Part number	05117



Pin assigment

Pin	HSD Connector D4S10A-1D5A5-Z
1	Not connected
2	CH1 MDI+
3	CH1 MDI-
4	Not connected
Shield	Connected

Pin	D-SUB9 Connector
1...3	Not connected
4	CH1 MDI+
5	CH1 MDI-
6...9	Not connected
Shield	Connected

Note

When using this cable, only Ethernet channel 1 is supported. Channel 2 is not connected.

6.2.7 VNcable D-SUB9 HSD Z Female

Connection cable

Description	Connection cable for BroadR-Reach Ethernet network interfaces
Length	approx. 50 cm
Connectors	1x Rosenberger HSD Z (female) 1x D-SUB9 (female)
Part number	05118



Pin assigment

Pin	HSD Connector D4K10A-1D5A5-Z
1	Not connected
2	CH1 MDI+
3	CH1 MDI-
4	Not connected
Shield	Connected

Pin	D-SUB9 Connector
1...3	Not connected
4	CH1 MDI+
5	CH1 MDI-
6...9	Not connected
Shield	Connected

Note

When using this cable, only Ethernet channel 1 is supported. Channel 2 is not connected

6.2.8 Ethernet Cables

6.2.8.1 Ethernet Cable 0.25m

Connection cable

Description	Cable for Ethernet network interfaces.
Length	approx. 0.25 m
Connectors	2x RJ45
Temp. range	Fixed installation: -10 °C ...+60 °C
Min. bending radius	Fixed installation: 90 mm
Part number	29064

6.2.8.2 Ethernet Cable 10Gbps 0.5m

Connection cable

Description	Cable for Ethernet network interfaces. Designed for vehicle interiors.
Length	approx. 0.5 m
Connectors	2x RJ45 (LxWxH: 41.9 x 12.1 x 15.6 mm)
Category	Cat 6A
Temp. range	Fixed installation: -20 °C ...+60 °C
Min. bending radius	Fixed installation: 87 mm
Outer diameter	6.2 mm
Part number	30017



6.2.8.3 Ethernet Cable 10Gbps 2m

Connection cable

Description	Cable for Ethernet network interfaces. Designed for vehicle interiors.
Length	approx. 2 m
Connectors	2x RJ45 (LxWxH: 41.9 x 12.1 x 15.6 mm)
Category	Cat 6A
Rated voltage	250 V
Temp. range	Fixed installation: -20 °C ...+60 °C
Min. bending radius	Fixed installation: 87 mm
Outer diameter	6.2 mm
Part number	30016



6.2.8.4 Ethernet Cable 10Gbps 7.5m

Connection cable

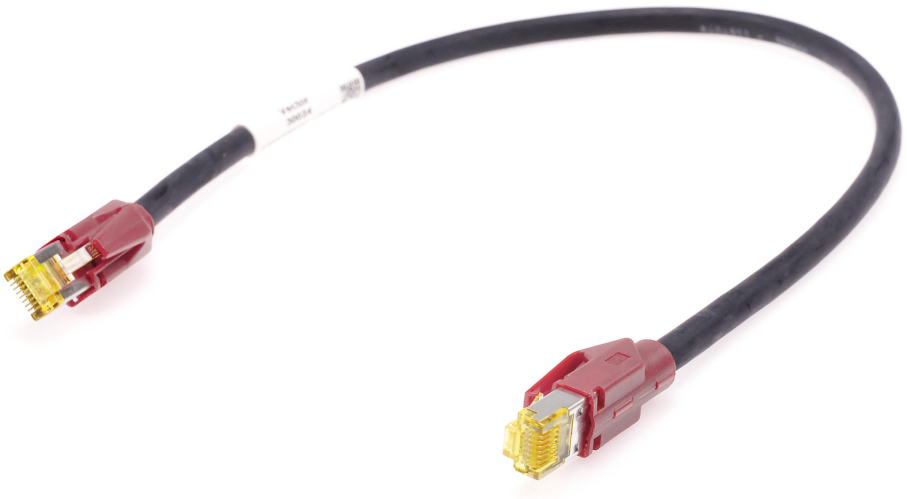
Description	Cable for Ethernet network interfaces. Designed for vehicle interiors.
Length	approx. 7.5 m
Connectors	2x RJ45 (LxWxH: 41.9 x 12.1 x 15.6 mm)
Category	Cat 6A
Temp. range	-20 °C ...+60 °C
Min. bending radius	60 mm
Outer diameter	6.2 mm
Part number	30018



6.2.8.5 Ethernet Cable Robust 10Gbps 0.5m

Connection cable

Description	Robust cable for Ethernet network interfaces. Designed for vehicle interiors during demanding long-term vehicle testing, with extended temperature range and higher cable robustness against oil, fuel and ozone.
Length	approx. 0.5 m
Connectors	2x RJ45 (LxWxH: 44.7 x 13.4 x 16.1 mm)
Temp. range	-40 °C ...+80 °C
Category	Cat 6A
Min. bending radius	Fixed installation: 40 mm
Outer diameter	6.6 mm
Part number	30024



6.2.8.6 Ethernet Cable Robust 10Gbps 2.0m

Connection cable

Description	Robust cable for Ethernet network interfaces. Designed for vehicle interiors during demanding long-term vehicle testing, with extended temperature range and higher cable robustness against oil, fuel and ozone.
Length	approx. 2 m
Connectors	2x RJ45 (LxWxH: 44.7 x 13.4 x 16.1 mm)
Temp. range	-40 °C ...+80 °C
Category	Cat 6A
Min. bending radius	Fixed installation: 40 mm
Outer diameter	6.6 mm
Part number	30025



6.2.8.7 Ethernet Cable Robust 10Gbps 7.5m

Connection cable

Description	Robust cable for Ethernet network interfaces. Designed for vehicle interiors during demanding long-term vehicle testing, with extended temperature range and higher cable robustness against oil, fuel and ozone.
Length	approx. 7.5 m
Connectors	2x RJ45 (LxWxH: 44.7 x 13.4 x 16.1 mm)
Temp. range	-40 °C ...+80 °C
Category	Cat 6A
Min. bending radius	Fixed installation: 40 mm
Outer diameter	6.6 mm
Part number	30026



6.3 FlexRay

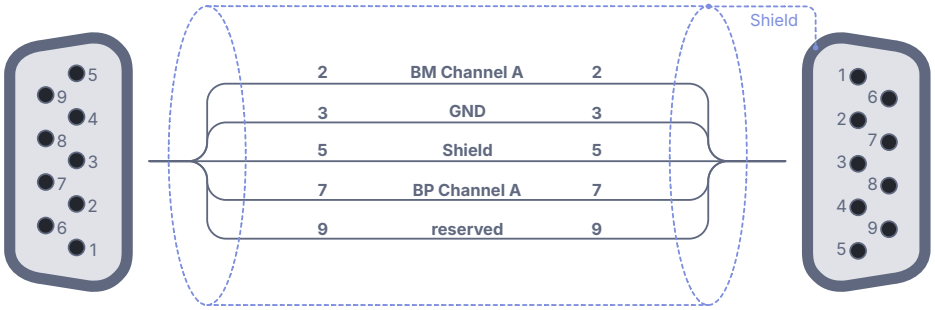
6.3.1 FRcable Set

Description	Cable set for FlexRay incl.: > 1x FRcable A > 1x FRcable AB > 2x FRterm
Temp. range	Fixed installation: -20 °C ...+60 °C Flexible use: 0 °C ...+50 °C
Min. bending radius	Fixed installation: 20 mm
Part number	05062

6.3.2 FRcable A

Description	Cable for connection of a FlexRay Interface to the FlexRay bus (Channel A)
Length	1 m
Connectors	2x D-SUB9 connectors (female)
Temp. range	Fixed installation: -20 °C ...+60 °C Flexible use: 0 °C ...+50 °C
Min. bending radius	Fixed installation: 20 mm
Properties	Provides only channel A at the FlexRay interface
Part number	Included in FRcable Set (part number 05062)

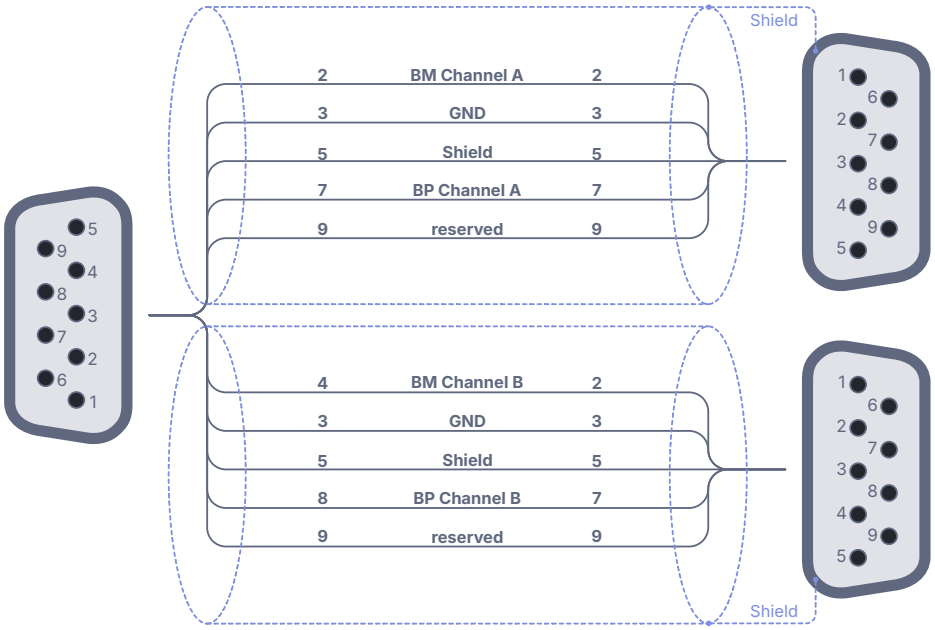
Setup



6.3.3 FRcable AB

Description	Cable for connection of a FlexRay Interface to the FlexRay bus (Channel A and B)
Length	1 m
Connectors	3x D-SUB9 connectors (female)
Temp. range	Fixed installation: -20 °C ...+60 °C Flexible use: 0 °C ...+50 °C
Min. bending radius	Fixed installation: 20 mm
Properties	Provides channel A and B at the FlexRay interface. The pin assignment of both single ended connectors is identical and suitable for replacement of an existing FlexCard configuration.
Part number	Included in FRcable Set (part number 05062)

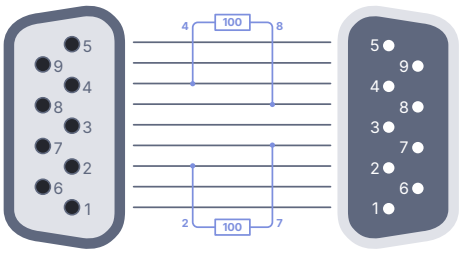
Setup



6.3.4 FRterm

Description	FlexRay adapter for termination of a FlexRay cluster (channel A and B). Pin assignment suited for VN3300/VN3600/VN7600/VN8970.
Rated voltage	300 V
Operating temp.	-25 °C ... +105 °C
Connectors	1x D-SUB9 connector (female) 1x D-SUB9 connector (male)
Properties	2x 100 ohm terminating resistor
Part number	05057

Setup

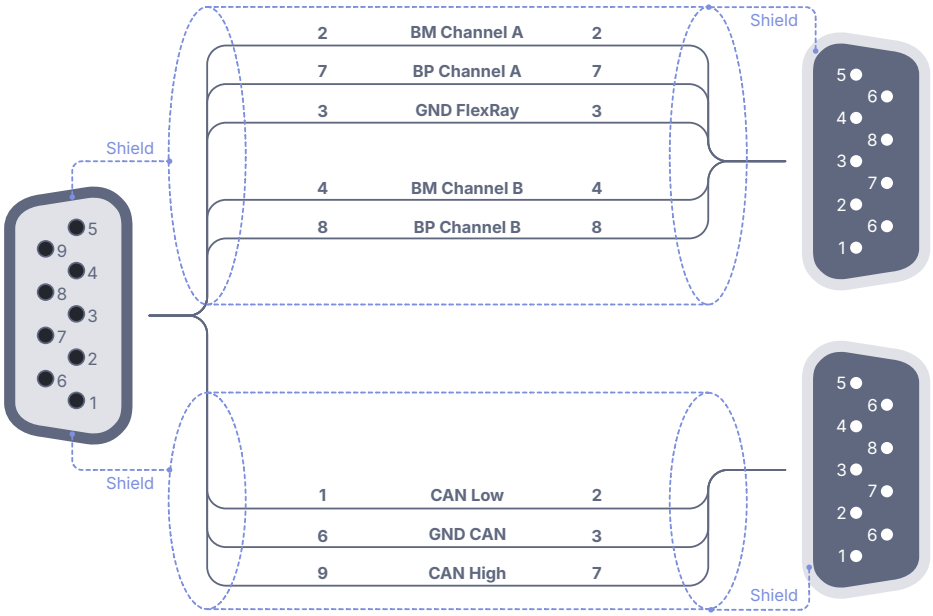


6.3.5 FR/CANcable 2Y

Y cable

Description	Y cable for Vector FR/CAN interfaces with D-SUB9 double assignment (e. g. VN7610). Splits the double assignment into two separate D-SUB9 connectors.
Length	0.3 m
Connectors	1x female D-SUB9 connector 2x male D-SUB9 connectors
Temp. range	Fixed installation: -20 °C ...+60 °C Flexible use: 0 °C ...+50 °C
Min. bending radius	Fixed installation: 20 mm
Part number	05099

Setup



6.4 OBDcables

6.4.1 OBDcable CAN

Connection cable

Description	OBD-II to D-SUB9 cable for CAN High-Speed
Length	2 m
Connectors	1x 16-pin OBD-II connector (male), type A (12 V) 1x D-SUB9 (female)
Temp. range	Fixed installation: -20 °C ...+80 °C Flexible use: -5 °C ...+50 °C
Min. bending radius	Fixed installation: 63.0 mm Flexible use: 94.5 mm
Part number	22089

OBD-II Pin	Assignment	D-SUB9 Pin
14	CAN Low	2
5	GND	3
6	CAN High	7

6.4.2 OBDcable OEM GM

Connection cable

Description	OBD-II to D-SUB9 cable (GM specific layout)
Length	2 m
Connectors	1x 16-pin OBD-II connector (male), type A (12 V) 2x D-SUB9 (female)
Part number	22247

OBD-II Pin	Assignment	D-SUB9 (Red)
11	Mid-Speed CAN Low	1
5	GND	3
1	Single Wire CAN	7
3	Mid-Speed CAN High	8
16	VBatt	9

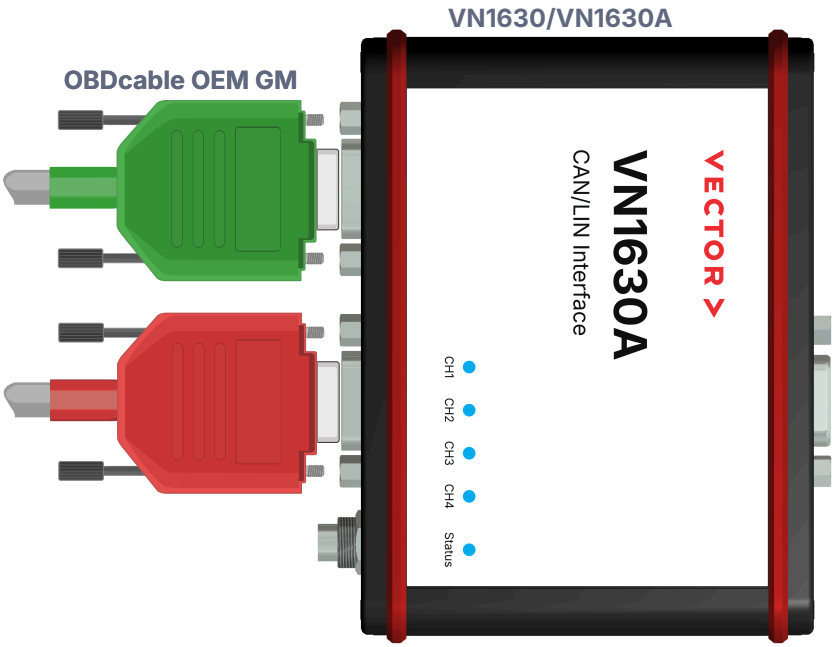
OBD-II Pin	Assignment	D-SUB9 (Green)
13	Chassis Exp. Bus Low	1
14	High-Speed CAN Low	2
6	High-Speed CAN High	7
12	Chassis Exp. Bus High	8

Example of usage

The OBDcable OEM GM is designed for usage with VN1630/VN1630A. Please use the following piggyback configuration:

- CH1: Single Wire CAN, e. g. CANpiggy 7356cap
- CH2: CAN High-Speed, e. g. CANpiggy 1051cap

Connect the ODBcable OEM GM as follows:



6.4.3 OBDcable OEM01

Connection cable

Description	OBD-II to D-SUB9 cable (for BMS, HS, IMS)
Length	2 m
Connectors	1x 16-pin OBD-II connector (male), type A (12 V) 3x D-SUB9 (female)
Temp. range	Fixed installation: -20 °C ...+80 °C Flexible use: -5 °C ...+70 °C
Min. bending radius	Fixed installation: 24.4 mm Flexible use: 61.0 mm
Part number	22071

OBD-II Pin	Assignment	D-SUB9 (BMS)
11	Vendor Specific	2
5	GND	3
3	Vendor Specific	7

OBD-II Pin	Assignment	D-SUB9 (High-Speed)
14	CAN Low	2
5	GND	3
6	CAN High	7
16	VBatt	9

OBD-II Pin	Assignment	D-SUB9 (IMS)
8	Vendor Specific	2
5	GND	3
1	Vendor Specific	7

6.4.4 OBDcable DoIP/CAN B1

Connection cable

Description	OBD-II to DoIP and CAN connection cable for VX0312
Length	Approx. 1.2 m (overall length)
Connectors	1x 16-pin OBD-II connector (male), type B (24 V) 1x 2-pin LEMO connector (male) 1x RJ45
Temp. range	Fixed installation: -40 °C ... +80 °C Flexible use: -30 °C ... +80 °C
Min. bending radius	repeated: 8 cm (8 x 10mm +/-0.2) single: 4 cm (4 x 10mm +/-0.2)
Part number	22547



Pin assignments

OBD-II	RJ45	LEMO	Assignment
1/2	-	-	Not connected
3	3	-	100BaseT RX+
4	-	-	Chassis GND
5	-	Housing	Signal GND (CAN, DoIP activation line)
6	-	1	CAN High-Speed High
7	-	-	LIN/K-Line Data (not used)
8	-	-	DoIP Activation Line (connected via resistor to OBD-II pin 16)
9/10	-	-	Not connected
11	6	-	100BaseT RX-
12	1	-	100BaseT TX+
13	2	-	100BaseT TX-

Pin assignments

OBD-II	RJ45	LEMO	Assignment
14	-	2	CAN High-Speed Low
15	-	-	Not connected
16	-	-	VBatt, permanent positive voltage (connected via resistor to OBD-II pin 8)

Note

The pin assignment of the OBD-II connector is according to option #1 ISO/DIS 13400-4:2015-07.

Note

Please note that pin 8 and 16 of the OBDcable are connected via a resistor. Connecting the cable to the vehicle will wake up the diagnostic gateway which may be in sleep mode.

WARNING!

To protect against hazardous situations, the equipment (cable and Vector device) must be connected only to power supplies providing limited energy. This can be achieved by using slow blow fuses or equivalent. The specific voltage and current ranges of the connected Vector device must be taken into account.

6.5 USB Cables and Hub

6.5.1 USB Cable 2.0

Technical data

Description	Standard USB 2.0 cable
Length	approx. 1.8 m
Rated voltage	30 V
Min. bending radius	30.0 mm
Max. operating temp.	80 °C
Connectors	1x connector Type-A 1x connector Type-B
Part number	05011



6.5.2 USB Cable 2.0 (C-B, 1.8m)

Technical data

Description	Standard USB 2.0 cable
Length	approx. 1.8 m
Rated voltage	30 V
Min. bending radius	28.2 mm
Max. operating temp.	80 °C
Connectors	1x connector Type-C 1x connector Type-B
Part number	05215



6.5.3 USB Cable 3.0 (A-B, 1.8m)

Technical data

Description	Standard USB 3.0 cable
Length	approx. 1.8 m
Rated voltage	30 V
Operating temp.	-10 °C ... +60 °C
Connectors	1x connector Type-A 1x connector Type-B
Max. data rate	5 Gbit/s
Part number	05092



6.5.4 USB Cable 3.0 (Type-B Conn. with Screws)

Technical data

Description	USB 3.0 cable
Length	approx. 1.8 m
Rated voltage	30 V
Min. bending radius	33.0 mm
Max. operating temp.	80 °C
Connectors	1x connector Type-A 1x connector Type-B (with screws)
Max. data rate	5 Gbit/s
Part number	05113



6.5.5 USB Cable 3.1 Type A-C (Dual Screw Lock)

Technical data

Description	USB 3.1 cable
Length	approx. 1.8 m
Rated voltage	30 V
Min. bending radius	27.0 mm
Max. operating temp.	80 °C
Connectors	1x connector Type-A 1x connector Type-C with screws
Max. data rate	5 Gbit/s
Part number	05140



6.5.6 USB Cable 3.1 Type C-C (Dual Screw Lock)

Technical data

Description	USB 3.1 cable
Length	approx. 1.8 m
Rated voltage	30 V
Min. bending radius	28.8 mm
Max. operating temp.	80 °C
Connectors	1x connector Type-C 1x connector Type-C with screws
Max. data rate	5 Gbit/s
Part number	05141



6.5.7 USBcable 3.2 Gen 2 C-C SDSL

Technical data

Description	USB 3.2 cable. This cable is primarily intended for use with the USB hub. SDSL: Single-sided Dual Screw Lock
Length	approx. 1.5 m
Rated voltage	30 V
Min. bending radius	28.8 mm
Max. operating temp.	80 °C
Connectors	1x connector Type-C 1x connector Type-C with screws
Max. data rate	10 Gbit/s
Part number	05227



6.5.8 USBcable 3.2 Gen 2 C-C DDSL

Technical data

Description	USB 3.2 cable. This cable is primarily intended for use with the USB hub. DDSL: Double-sided Dual Screw Lock
Length	approx. 1.5 m
Rated voltage	30 V
Min. bending radius	28.8 mm
Max. operating temp.	80 °C
Connectors	2x connector Type-C with screws
Max. data rate	10 Gbit/s
Part number	05226



6.5.9 USBcable 3.2 Gen 2 C-B DDSL

Technical data

Description	USB 3.2 cable. This cable is primarily intended for use with the USB hub. DDSL: Double-sided Dual Screw Lock
Length	approx. 1.5 m
Rated voltage	30 V
Min. bending radius	27.0 mm
Max. operating temp.	80 °C
Connectors	1x connector Type-B 1x connector Type-C with screws
Max. data rate	10 Gbit/s
Part number	05228



6.5.10 USBadapter 3.2 Gen 1 C-A SDSL

Technical data

Description	USB 3.2 adapter SDSL: Single-sided Dual Screw Lock
Length	approx. 0.1 m
Rated voltage	30 V
Min. bending radius	27.0 mm
Max. operating temp.	80 °C
Connectors	1x connector Type-A (female) 1x connector Type-C with screws
Max. data rate	10 Gbit/s
Part number	05229



6.5.11 USB 3.2 Gen2x1 Hub

Technical data

Description	USB 3.2 Gen2x1 hub with one USB Type-A and three USB Type-C downstream ports for secure data transfer at high speeds of up to 10 Gbit/s. With metal housing and mounting equipment. User manual included in delivery.
Ports	3x USB Type-C port with up to 3 A @ 5 V > cable fixation according to USB Type-C Locking Connector Specification 1x USB Type-A port with up to 1.5 A @ 5 V > cable fixation according to USB3 Vision standard One USB Type-C upstream port supporting up to 10 Gbit/s.
Power supply	Input range: > typ.: 9...24 V, up to 60 W > max.: 9...26.4 V, up to 60 W 1x DC coaxial connector 5.5 mm x 2.1 mm > Recommended: part no. 05233 (see section Power Supply 24V/2.5A DC Coaxial Plug on page 187) 1x Terminal block
Part number	05225





Terminal block

Connector	Description
V+	Power supply plus (typ. 9...24 V, up to 60 W)
V-	Power supply minus (no PE/FG!)
G	System ground

WARNING!

To avoid damage to your devices and equipment, please note that **V-** must not be connected to AC Protective Earth (PE) or Functional Ground (FG)!

WARNING!

When using the USB 3.2 Gen2x1 Hub in a vehicle, an electrically isolated power supply must be used!

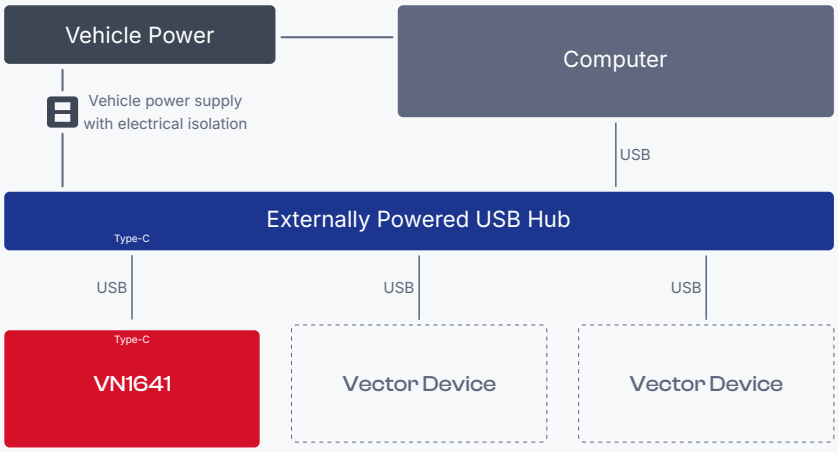


Figure 32: Example with VN1641

Note

The USB 3.2 Gen2x1 hub is a self-powered hub.

To avoid draining the battery (e. g. of a car or laptop), the hub is completely shut down by unplugging the USB host connection cable or the power adapter. This is different from typical consumer (bus-powered) hubs.

6.6 Miscellaneous

6.6.1 Cable Binder 3pol Connector with Pigtail

All-purpose cable

Description	Connection cable for time synchronization at Vector devices
Length	1.5 m
Connectors	1x female 3-pin Binder connector (type 711) 3x stripped wires
Temp. range	Fixed installation: -25 °C ...+70 °C Flexible use: -5 °C ...+70 °C
Min. bending radius	Fixed installation: 16.8 mm Flexible use: 42.0 mm
Part number	30011



Binder Pin	Assignment	Wire
1	Vbat	White
2	Signal	Green
3	Ground	Brown



WARNING!

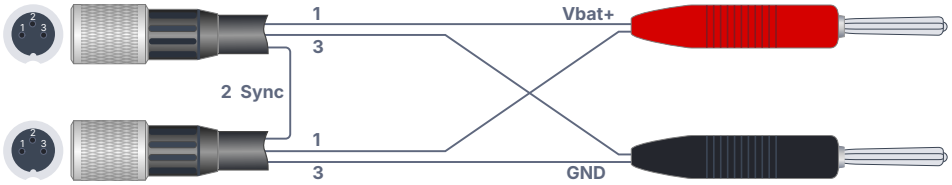
To protect against hazardous situations, the equipment (cable and Vector device) must be connected only to power supplies providing limited

energy. This can be achieved by using slow blow fuses or equivalent. The specific voltage and current ranges of the connected Vector device must be taken into account.

6.6.2 Power Sync Cable 2xBinder <> Banana Plugs

Power cable

Description	Power cable with hardware synchronization capability for Vector devices (requires Vector devices with hardware synchronization support)
Length	1.5 m
Connectors	2x female 3-pin Binder connector (type 711) 2x banana plugs (4 mm)
Part number	05123



WARNING!

To protect against hazardous situations, the equipment (cable and Vector device) must be connected only to power supplies providing limited energy. This can be achieved by using slow blow fuses or equivalent. The specific voltage and current ranges of the connected Vector device must be taken into account.

6.6.3 Breakout Box D62Y9

Breakout box

Description	Breakout box for VN7570 and VN7572 (requires VNcable DSUB62 or VNcable DSUB62 A)
Dimensions	165 mm x 52 mm x 69 mm (W x H x D), incl. rubber feet and connectors
Weight	580 g
Connectors	1x D-SUB62 (female) 8x D-SUB9 (male) 1x D-SUB15 (female)
Properties	Can be mounted with 4x M4 screws
Part number	05090



CH1...CH8

Assignment for Piggybacks					Assignment for On-board CAN				
D-SUB62				D-SUB9	D-SUB62				D-SUB9
CH1	**CH2**	**CH3**	**CH4**	**CH1 ... CH4**	**CH5**	**CH6**	**CH7**	**CH8**	**CH5 ... CH8**
45	47	50	53	(1)*	-	-	-	-	(1) N.C.
22	3	28	9	(2)*	12	13	14	15	(2) CAN Low
1	25	7	31	(3)*	54	55	56	57	(3) GND
23	4	29	10	(4)*	-	-	-	-	(4) N.C.
6	6	6	6	(5)*	6	6	6	6	(5) Shield
2	26	8	32	(6)*	-	-	-	-	(6) N.C.
24	5	30	11	(7)*	33	34	35	36	(7) CAN High
43	27	48	51	(8)*	-	-	-	-	(8) N.C.
44	46	49	52	(9)*	-	-	-	-	(9) N.C.

* Depends on the inserted piggyback in VN7570/VN7572.

N.C. Not connected

CH9

Assignment for IOpiggy 8642					
D-SUB62	**D-SUB15**	**Pinout 1**	**Pinout 2**	**Pinout 3**	**Pinout 4**
16	9	Digital In 1	Digital Out 1[1]	Digital Out 1[2]	-
17	10	Digital In 3	Digital Out 3[1]	Digital Out 3[2]	-
18	11	Digital In 5	Digital Out 4b[3]	-	-
19	12	Digital In 7	Digital Out 5b[3]	-	-
20	**13**	**Digital GND**			
37	1	Digital In 0	Digital Out 0[1]	Digital Out 0[2]	PWM 1
38	2	Digital In 2	Digital Out 2[1]	Digital Out 2[2]	-
39	3	Digital In 4	Digital Out 4a[3]	-	-
40	4	Digital In 6	Digital Out 5a[3]	-	-
41	5	PWM 0	Capture	-	-
58	**6**	**Analog GND**			
59	14	Analog In 0	Analog Out 0[1]	-	-
60	7	Analog In 1	Analog Out 1[1]	-	-
61	15	Analog In 2	-	-	-
62	8	Analog In 3	-	-	-

1) Push-Pull
2) Open-Drain
3) a/b line: switched by PhotoMOS relais, external signal at a is switched to b.

6.6.4 VNcable DSUB62

Breakout box cable

Description	Connection cable with D-SUB62 connectors for Breakout Box D62Y9, VN7570 and VN7572
Length	0.5 m (cable only) 0.6 m (overall length)
Connectors	1x D-SUB62 (male) 1x D-SUB62 (female)
Temp. range	-20 °C ...+80 °C
Min. bending radius	Fixed installation: 40 mm Flexible use: 100 mm
Part number	05087



6.6.5 VNcable DSUB62 A

Breakout box cable

Description	Connection cable with D-SUB62 connectors for Breakout Box D62Y9, VN7570 and VN7572
Length	1.2 m (cable only) 1.3 m (overall length)
Connectors	1x D-SUB62 (male) 1x D-SUB62 (female)
Temp. range	-20 °C ...+80 °C
Min. bending radius	Fixed installation: 40 mm Flexible use: 100 mm
Part number	05093



6.6.6 VNcable DSUB62 B

Connection cable

Description	Connection cable with D-SUB62 connector and open end
Length	2 m (overall length)
Connectors	1x D-SUB62 (female) 62x wire
Temp. range	-20 °C ...+80 °C
Min. bending radius	Fixed installation: 40 mm Flexible use: 100 mm
Part number	05095



Pin assignment

	Pin	Color		Pin	Color
TP	1 44	dark brown brown-white	TP	19 40	grey grey-black
TP	2 45	red red-black	TP	20 41	grey-red blue-grey
TP	3 5	red-white red-blue	TP	22 24	grey-yellow grey-green
TP	4 27	orange orange-black	TP	23 43	white white-black
TP	6 62	red-orange orange-green	TP	25 46	white-red white-light blue
TP	7 49	orange-white grey-white	TP	26 47	yellow-white white-light green
TP	8 50	yellow yellow-black	TP	28 30	pink pink-black
TP	9 11	red-yellow yellow-blue	TP	29 48	pink-red pink-blue
TP	10 51	yellow-white light yellow-black	TP	31 52	pink-white pink-yellow
TP	12 33	green green-black	TP	32 53	light green light green-black

Pin assignment

	Pin	Color		Pin	Color
TP	13 34	green-white light green-blue	TP	54 55	light green-yellow light green-green
TP	14 35	green-blue light green-red	TP	56 57	light blue light blue-black
TP	15 36	blue blue-white	TP	58 59	light blue-red light blue-blue
TP	16 37	blue-red violet-red	TP	60 61	light blue-yellow light blue-green
TP	17 38	violet violet-white		21 42	not connected not connected
TP	18 39	violet-green violet-blue			

TP = twisted pair

6.6.7 VNcable D62Y9

Y cable

Description	Adapter cable for VN7570 and VN7572
Length	approx. 0.5 m (overall length) approx. 0.4 m without connectors
Connectors	1x D-SUB62 (female) 1x D-SUB15 (female) 8x D-SUB9 (male)
Part number	05088



CH1...CH8

Assignment for Piggybacks					Assignment for On-board CAN				
D-SUB62				D-SUB9	D-SUB62				D-SUB9
CH1	**CH2**	**CH3**	**CH4**	**CH1 ... CH4**	**CH5**	**CH6**	**CH7**	**CH8**	**CH5 ... CH8**
45	47	50	53	(1)*	-	-	-	-	(1) N.C.
22	3	28	9	(2)*	12	13	14	15	(2) CAN Low
1	25	7	31	(3)*	54	55	56	57	(3) GND
23	4	29	10	(4)*	-	-	-	-	(4) N.C.
6	6	6	6	(5)*	6	6	6	6	(5) Shield
2	26	8	32	(6)*	-	-	-	-	(6) N.C.
24	5	30	11	(7)*	33	34	35	36	(7) CAN High
43	27	48	51	(8)*	-	-	-	-	(8) N.C.
44	46	49	52	(9)*	-	-	-	-	(9) N.C.

* Depends on the inserted piggyback in VN7570/VN7572.

N.C. Not connected

CH9

Assignment for IOpiggy 8642					
D-SUB62	**D-SUB15**	**Pinout 1**	**Pinout 2**	**Pinout 3**	**Pinout 4**
16	9	Digital In 1	Digital Out 1[1]	Digital Out 1[2]	-
17	10	Digital In 3	Digital Out 3[1]	Digital Out 3[2]	-
18	11	Digital In 5	Digital Out 4b[3]	-	-
19	12	Digital In 7	Digital Out 5b[3]	-	-
20	**13**	**Digital GND**			
37	1	Digital In 0	Digital Out 0[1]	Digital Out 0[2]	PWM 1
38	2	Digital In 2	Digital Out 2[1]	Digital Out 2[2]	-
39	3	Digital In 4	Digital Out 4a[3]	-	-
40	4	Digital In 6	Digital Out 5a[3]	-	-
41	5	PWM 0	Capture	-	-
58	**6**	**Analog GND**			
59	14	Analog In 0	Analog Out 0[1]	-	-
60	7	Analog In 1	Analog Out 1[1]	-	-
61	15	Analog In 2	-	-	-
62	8	Analog In 3	-	-	-

1) Push-Pull
2) Open-Drain
3) a/b line: switched by PhotoMOS relais, external signal at a is switched to b.

6.6.8 VNcable DSUB37

Connection cable

Description	Connection cable with D-SUB37 connectors
Length	1.5 m
Connectors	1x D-SUB37 (male) 1x D-SUB37 (female)
Part number	05097



6.6.9 VNcable 3Y

Y cable

Description	Y cable for Vector FlexRay/CAN/LIN interfaces with D-SUB15HD triple assignment. Splits a D-SUB15HD connector into three separate D-SUB9 connectors (CH A, CH B, CH C). Example: > **VN1530** CH1/2/3 → Channel 1 (CH A), 2 (CH B) and 3 (CH C) CH4/5/6 → Channel 4 (CH A), 5 (CH B) and 6 (CH C) The pin assignments of the D-SUB9 connectors CH A, CH B and CH C depend on the used bus transceivers inside the interface (see section D-SUB Pin Assignment on page 48).
Length	0.3 m
Rated voltage	30 V
Min. bending radius	37.8 mm
Max. operating temp.	80 °C
Connectors	1x female D-SUB15HD connector 3x male D-SUB9 connector
Part number	05122



Channel	Pin D-SUB9	Pin D-SUB15HD
A	2	14
	3	10
	7	15
	9	5
B	2	3
	3	9
	7	4
	9	13
C	1	2
	2	1
	3	7
	4	11
	7	6
	8	12
	9	8



WARNING!

This cable **cannot** be used for:

- VN1614
- VN1615

Instead, please use the VNcable 4Y (see section VNcable 4Y on page 177)

6.6.10 VNcable 4Y

Y cable

Description	Y cable for Vector CAN/LIN interfaces with D-SUB15HD fourfold assignment. Splits a D-SUB15HD connector into four separate D-SUB9 connectors (CH A, CH B, CH C, CH D). Example: > **VN1615** CH1→ CH A CH2→ CH B CH3→ CH C CH4→ CH D
Length	0.3 m
Connectors	1x female D-SUB15HD connector 4x male D-SUB9 connector
Part number	05247



Channel	Pin D-SUB9	Pin D-SUB15HD
A	2	1
	7	6
	3	7
	9	8
B	2	3
	7	4
	3	9
	9	13

Channel	Pin D-SUB9	Pin D-SUB15HD
C	3	10
	7	14
	2	15
D	3	2
	7	12
	2	11



WARNING!

This cable **cannot** be used for:

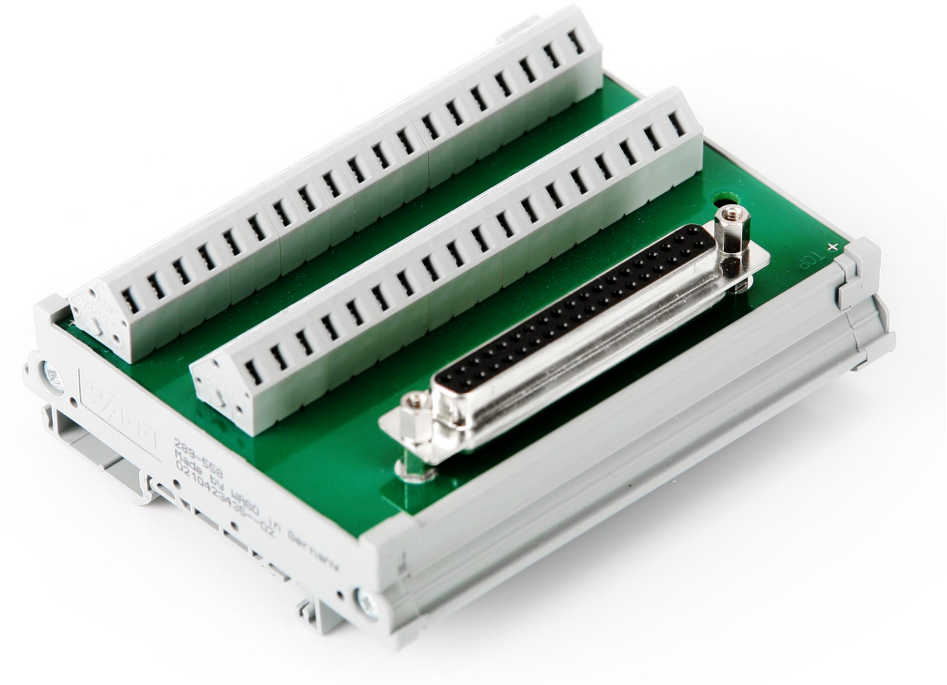
- VN1530
- VN1531
- VN1670

Instead, please use the VNcable 3Y (see section VNcable 3Y on page 175).

6.6.11 Terminal Block DSUB37

Terminal block

Description	Terminal block with 37 CAGE CLAMP® connectors to D-SUB37 (requires VNcable DSUB37)
Dimensions	102 mm x 34 mm x 85 mm
Weight	102 g
Connectors	1x row with 19 CAGE CLAMP® connectors 1x row with 18 CAGE CLAMP® connectors 1x D-SUB37 (female)
Part number	05098



6.6.12 VX1362B CAN Cable LEMO/Banana Plugs 1.5M

Connection cable

Description	Adapter cable for Vector devices
Length	1.5 m
Connectors	1x LEMO connector (FFA.0S.302.CLAC50) 2x banana plugs (4 mm)
Part number	22258



LEMO Pin	Assignment	Banana Plug
1	DIO	Yellow
2	GND	Green



7 Power Supply

In this chapter you find the following information:

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7.3.2 Cable Banana Plug <> ODU Mini-Snap 192

7.1 Vector Power Supply Units

7.1.1 Vector Power Supply 12V/1.5A

Power supply unit for Vector devices

Description	Power supply unit with 12 V and 1.5 A, with changeable adapters for USA and Europe (GB adapter on request)
Length	2 m
Input voltage	100 V ... 240 V AC (+/-10 %), 50 Hz ... 60 Hz
Connectors	1x adapter for USA 1x adapter for Europe 1x 3-pin Binder connector (type 711)
Part number	05024



7.1.2 Vector Power Supply ODU Mini-Snap

Power supply unit for Vector devices

Description	Power supply unit with 24 V and 2.5 A. Power cord not included.
Input voltage	100 V ... 240 V AC (+/-10 %), 47 Hz ... 63 Hz
Connectors	1x Connector for Europe IEC60320 C8 1x ODU S11L0C-P02NPL0-5200
Dimensions	Housing: 114.5 mm x 49.5 mm x 33 mm (LxWxH) Cable: approx. 2 m
Part number	05068



Connection cable

Description	Connection cable for power supply unit (part number 05068)
Connectors	Type-C (CEE7/16) to IEC 60320 C7
Length	Approx. 2 m
Part number	05251



Connection cable

Description	Connection cable for power supply unit (part number 05068)
Connectors	Type-A to IEC 60320 C7
Length	Approx. 2 m
Part number	05071



Connection cable

Description	Connection cable for power supply unit (part number 05068)
Connectors	Type-G („UK", BS1363) to IEC60320 C7
Length	Approx. 2 m
Part number	05070



Connection cable

Description	Connection cable for power supply unit (part number 05068)
Connectors	"PRC2" (Type A) to IEC60320 C7
Length	Approx. 2 m
Part number	05249



Connection cable

Description	Connection cable for power supply unit (part number 05068)
Connectors	Type-D to IEC60320 C7
Length	Approx. 1.8 m
Part number	05250



7.1.3 Power Supply 24V/2.5A DC Coaxial Plug

Technical data

Description	Power supply unit with 24 V and 2.5 A for use with USB 3.2 Gen2x1 hub (part no. 05225). Country specific AC connection cable included.
Connectors	1x Country specific AC connection cable (see below) 1x DC coaxial plug 5.5 mm x 2.1 mm
Part number	05233



Connection cable Europe

Description	Connection cable for power supply unit
Connectors	Connector for Europe
Part number	05244

Connection cable USA/Japan

Description	Connection cable for power supply unit
Connectors	Connector for USA/Japan
Part number	05115

Connection cable UK

Description	Connection cable for power supply unit
Connectors	Connector for UK
Part number	05125

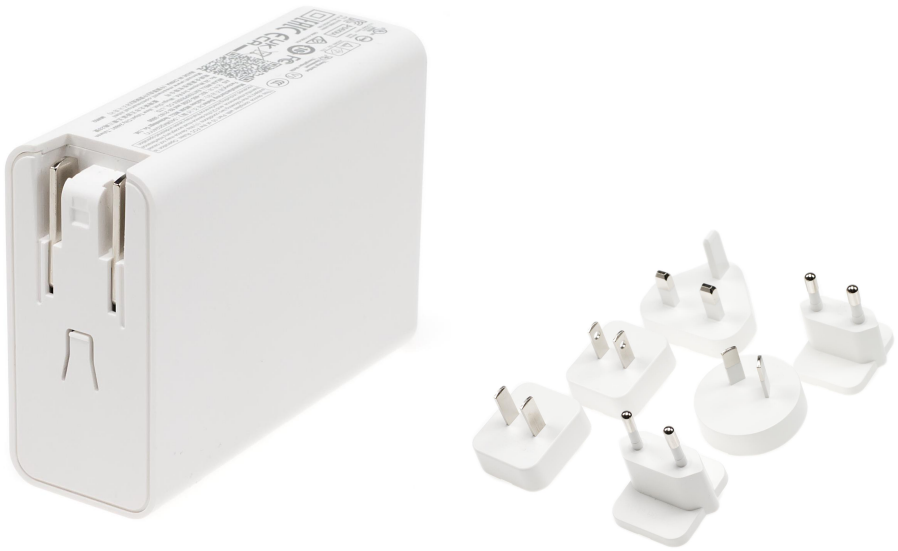
Connection cable China

Description	Connection cable for power supply unit
Connectors	Connector for China
Part number	05114

7.1.4 Power Supply USB-C Basic

Power supply unit USB Type-C

Description	This power supply delivers 3 A @ 5 V to one USB Type-C port. Other ports available that support USB Power Delivery (PD).
Connectors	1x AC: adapters for EU, US/JP, UK, CN, AU and KR included 1x DC: at least one USB Type-C
Part number	05234



7.2 On-Board Power Supply

7.2.1 Car Power Supply Cable 12V with Binder

On-board power supply

Description	On-board power supply cable
Connectors	1x 3-pin connector (Binder type 711) 1x 12V / 24V plug
Temp. range	Fixed installation: -20 °C ...+70 °C Flexible use: -20 °C ...+70 °C
Part number	15023



Note

Please check the supported supply voltage range of your Vector device before using the cable with a 24 V system.

7.2.2 Cable Vehicle Input <> ODU Mini-Snap

On-board power supply

Description	On-board power supply cable
Connectors	1x ODU S11L0C-P02NPL0-5200 1x 12V / 24V plug
Temp. range	Fixed installation: -20 °C ... +70 °C Flexible use: -20 °C ... +70 °C
Part number	05076



7.3 Power Supply Cable

7.3.1 Cable Banana Plug <> Binder 3-pin

Power cable

Description	Power cable for Vector devices
Length	1.5 m
Connectors	1x female 3-pin Binder connector (type 711) 2x banana plugs (4 mm)
Temp. range	Fixed installation: -25 °C ...+70 °C Flexible use: -5 °C ...+70 °C
Min. bending radius	Fixed installation: 16.8 mm Flexible use: 42.0 mm
Part number	30012



Binder Pin	Assignment	Banana Plug
1	+12 V	Red
2	Not connected	-
3	Ground	Black



WARNING!

To protect against hazardous situations, the equipment (cable and Vector device) must be connected only to power supplies providing limited energy. This can be achieved by using slow blow fuses or equivalent. The specific voltage and current ranges of the connected Vector device must be taken into account.

7.3.2 Cable Banana Plug <> ODU Mini-Snap

ODU

Description	Power cord for Vector devices with ODU MINI-SNAP connector
Length	approx. 2 m
Connectors	1x ODU connector (type S11L0C-P02NPL0-6200) 2x bunch plugs (power supply)
Temp. range	Fixed installation: -40 °C ...+75 °C Flexible use: -40 °C ...+75 °C
Min. bending radius	Fixed installation: 15.6 mm Flexible use: 26.0 mm
Part number	05069

ODU Pin	Assignment	Banana Plug
1	Vs	Red
2	Ground	Black



WARNING!

To protect against hazardous situations, the equipment (cable and Vector device) must be connected only to power supplies providing limited energy. This can be achieved by using slow blow fuses or equivalent. The specific voltage and current ranges of the connected Vector device must be taken into account.

8 Time Synchronization

In this chapter you find the following information:

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8.1.3 Hardware Sync 197

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8.1 Time Synchronization

8.1.1 General Information

Time stamps and events

Time stamps are useful when analyzing incoming or outgoing data or event sequences on a specific bus.

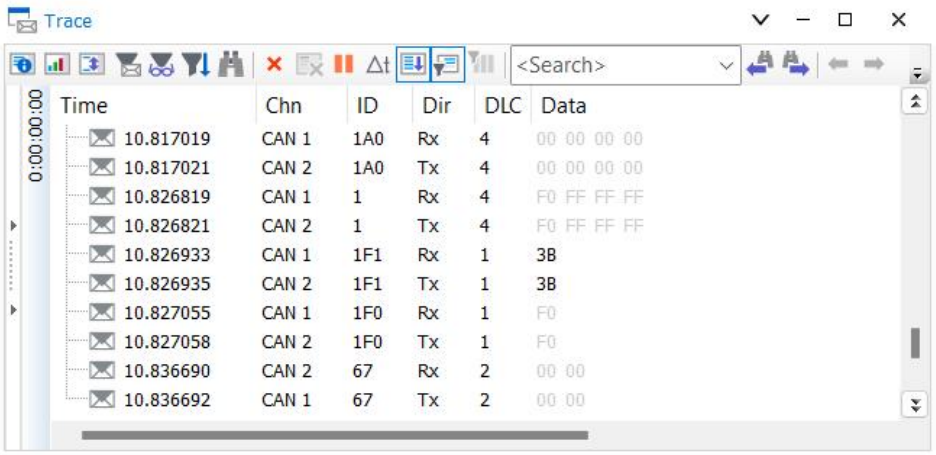


Figure 33: Time stamps of two CAN channels in CANoe

Generating time stamps

Each event which is sent or received by a Vector network interface has an accurate time stamp. Time stamps are generated for each channel in the Vector network interface. The base for these time stamps is a common hardware clock in the device.

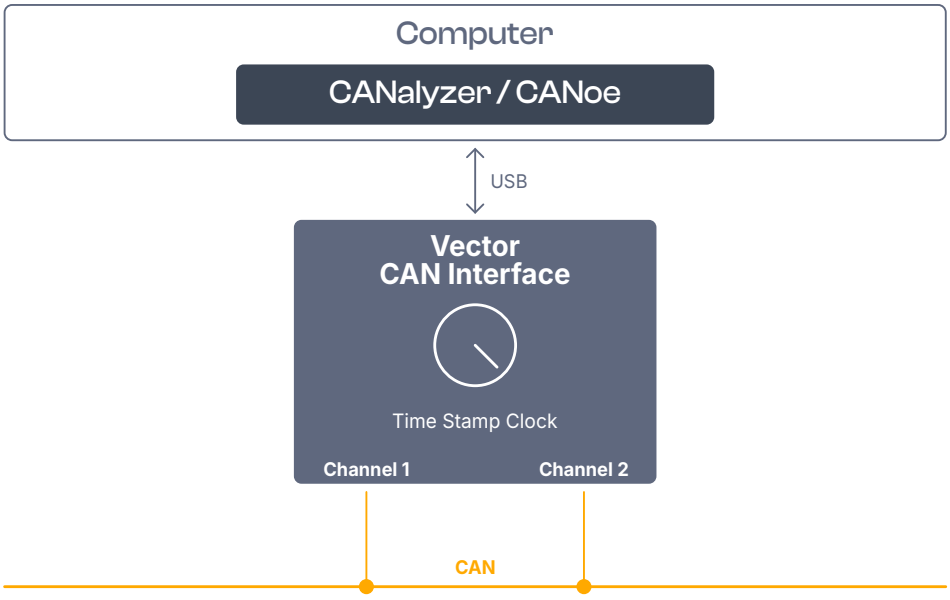


Figure 34: Common time stamp clock for each channel

If the measurement setup requires more than one Vector network interface, a synchronization of all connected interfaces and their hardware clocks is needed.

Due to manufacturing and temperature tolerances, the hardware clocks may vary in speed, so time stamps of various Vector devices drift over time.

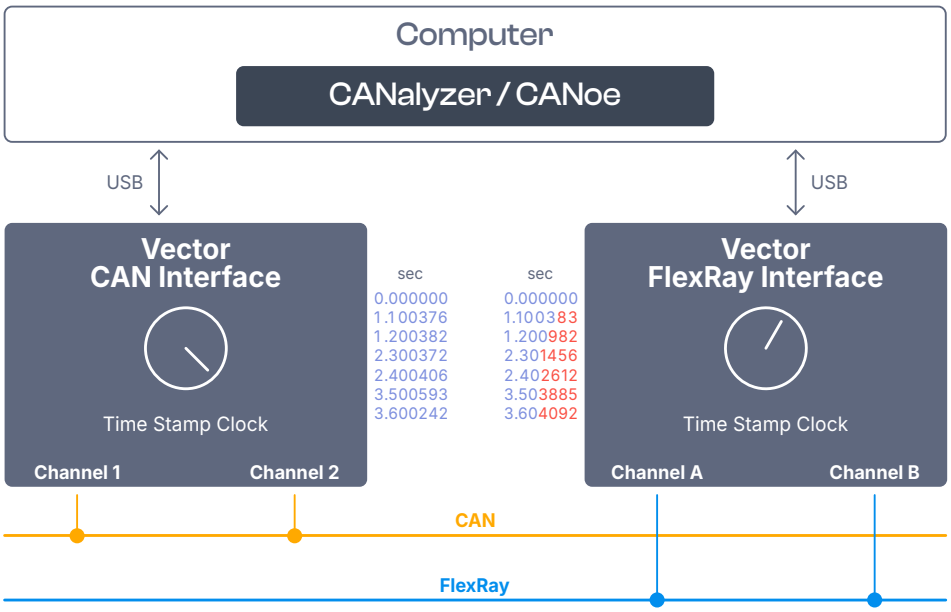


Figure 35: Example of unsynchronized network interfaces. Independent time stamps drift apart

To compensate for these time stamp deviations between the Vector network interfaces, the time stamps can be either synchronized by software, hardware, PTP or GNSS (capability depends on the Vector device).

Note

The accuracy of the software, hardware, PTP or GNSS sync depends on the interface. Further information on specific values can be found in the technical data of the respective devices.

8.1.2 Software Sync

8.1.2.1 General Information

Synchronization by software

The software time synchronization is driver-based and available for all applications without any restrictions. The time stamp deviations from different Vector network interfaces are calculated and synchronized to the common computer clock. For this purpose no further hardware setup is required.

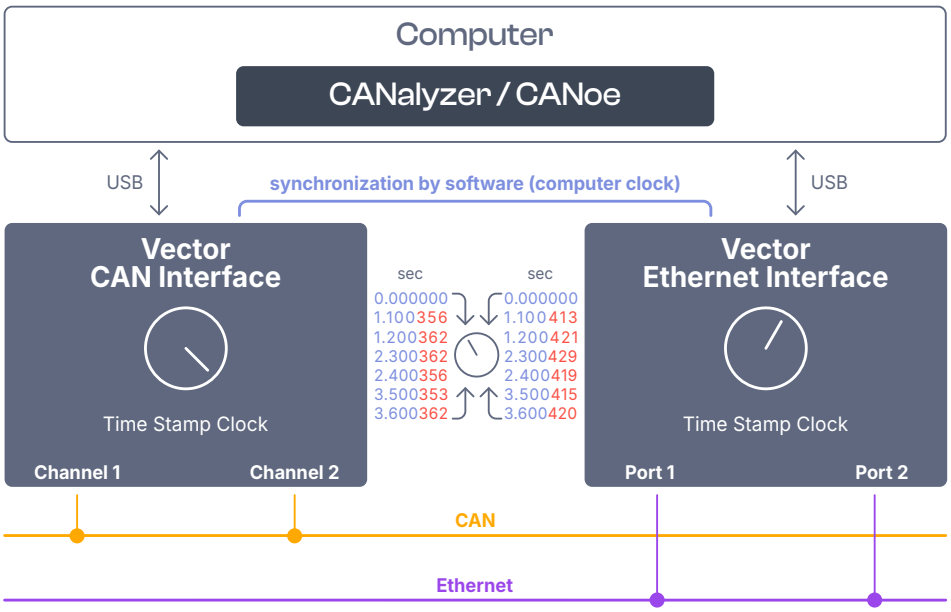


Figure 36: Time stamps of devices are synchronized to the computer clock

Note

Software time synchronization may lead to an increased latency for all connected Vector network interfaces. If a use case requires low latency, deactivate this option and use another synchronization mechanism.

8.1.2.2 Configuration

Vector Hardware Manager

Use the software synchronization if at least one device has no hardware sync connector. Also to synchronize the device clock to the computer time, use the software synchronization (legacy).

8.1.3 Hardware Sync

8.1.3.1 General Information

Synchronization by hardware

A more accurate time synchronization of multiple devices is provided by the hardware synchronization. Two Vector network interfaces can therefore be connected with the SYNCcableXL (see page 199).

In order to synchronize up to five devices at the same time, a distribution box is available (see section Multi SYNCbox External on page 201 and section Multi SYNCbox Internal on page 203).

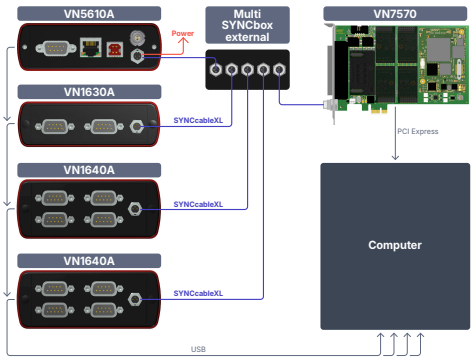


Figure 37: Example of a time synchronization with multiple devices

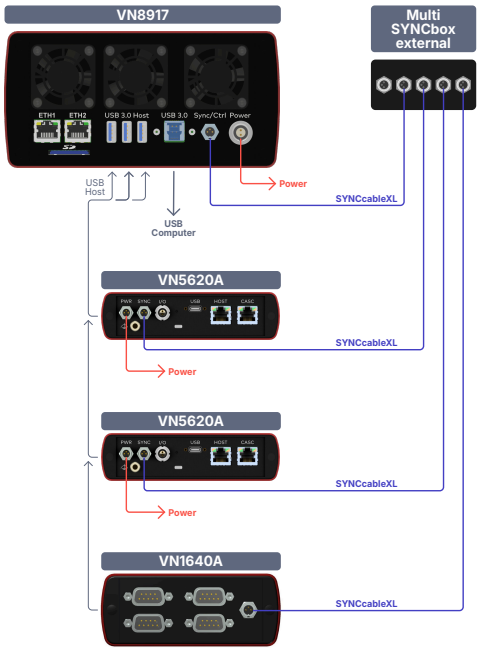


Figure 38: Example of a time synchronization with VN8917 and additional devices

At each falling edge on the sync line which is initiated by the driver, the Vector network interface generates a time stamp that is provided to the driver. This allows the driver to calculate the deviations between the network

interfaces and to synchronize the time stamps to a common time base (master clock) which can be defined by the user.

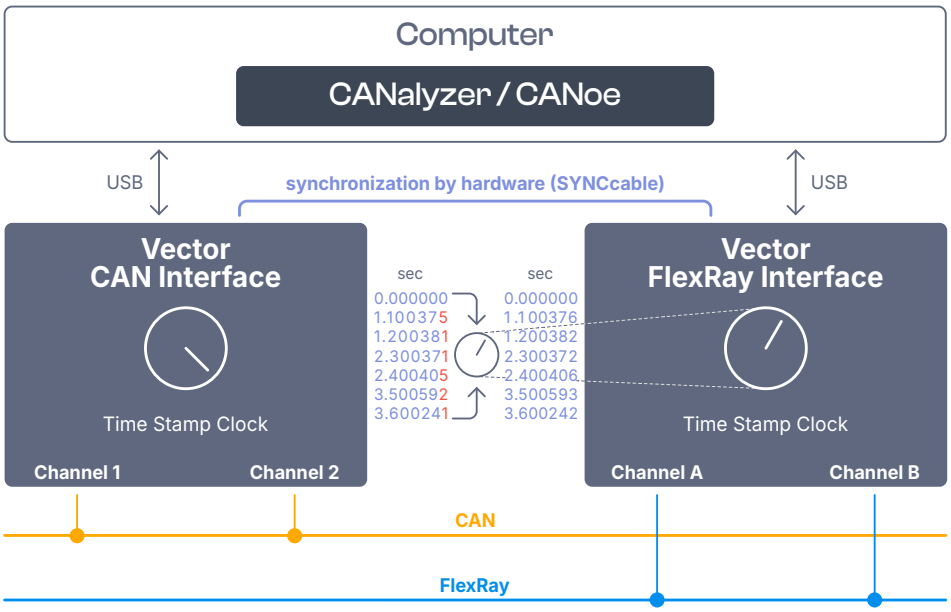


Figure 39: Time stamps are synchronized to the master clock

8.1.3.2 Configuration

Vector Hardware Manager

Use hardware synchronization if at least one device is connected with USB or PCIe to the PC and all devices are hardware sync capable. One device should be configured as master and all other devices as slaves. Therefore, all devices must be interconnected with SYNCcableXL and Multi SYNCbox external or SYNCbox active.

8.2 SYNCcables

8.2.1 Vector SYNCcableXL

Synchronization cable

Description	Connection cable for time synchronization of Vector devices
Length	2 m
Connectors	2x female 3-pin Binder connectors (type 711)
Temp. range	Fixed installation: -30 °C ...+80 °C Flexible use: -5 °C ...+70 °C
Min. bending radius	Fixed installation: 16 mm Flexible use: 40 mm
Part number	05018



Pin	Assignment
1	+12 V
2	Sync
3	Ground



8.2.2 Vector SYNCcable50

Synchronization cable

Description	Connection cable for time synchronization for Vector devices
Length	0.5 m
Connectors	2x female 3-pin Binder connectors (type 711)
Temp. range	Fixed installation: -30 °C ...+80 °C Flexible use: -5 °C ...+70 °C
Min. bending radius	Fixed installation: 16 mm Flexible use: 40 mm
Part number	05083



Pin	Assignment
1	+12 V
2	Sync
3	Ground



8.3 SYNCboxes

8.3.1 Multi SYNCbox External

Synchronization distributor

Description	Distributor in plastic case for time synchronization. For up to five Vector devices.
Connectors	5x male 3-pin connectors (Binder type 711)
Part number	05085



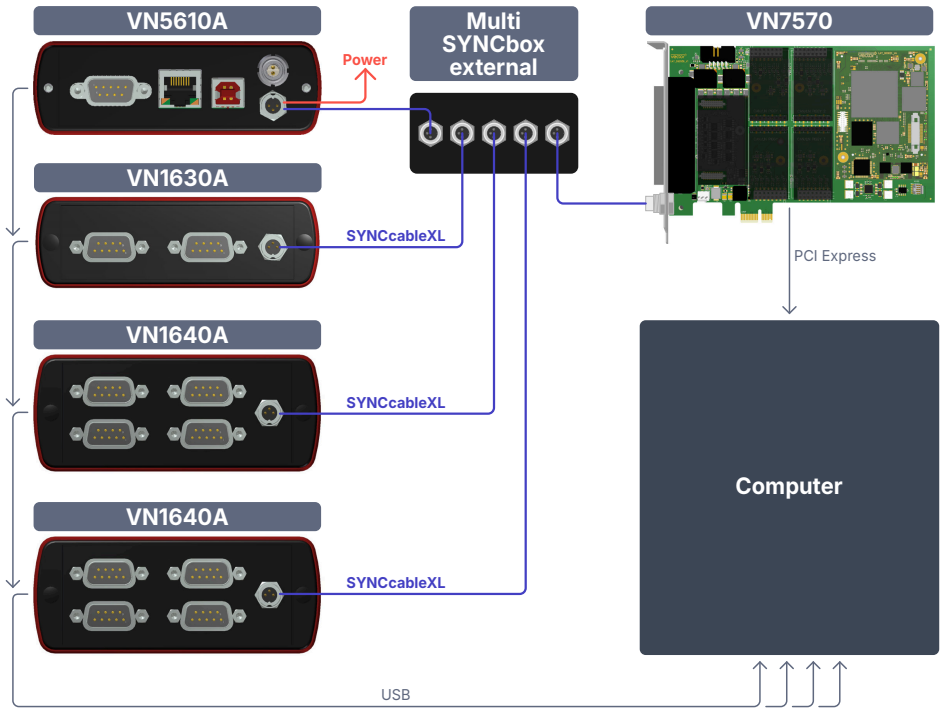
Pin	Assignment (all Binder connectors)
1	Not connected
2	Sync
3	Ground



Note

Within the sync system, up to five devices can be synchronized. Cascading of multiple Multi SYNCboxes to increase the number of devices is not possible.

Example


VN5610A
Power
Multi SYNCbox external
VN7570
VN1630A
SYNCcableXL
PCI Express
VN1640A
SYNCcableXL
Computer
VN1640A
SYNCcableXL
USB

8.3.2 Multi SYNCbox Internal

Synchronization distributor

Description	Distributor in PC slot bracket for time synchronization. For up to five Vector devices.
Connectors	5x male 3-pin connectors (Binder type 711)
Part number	05084



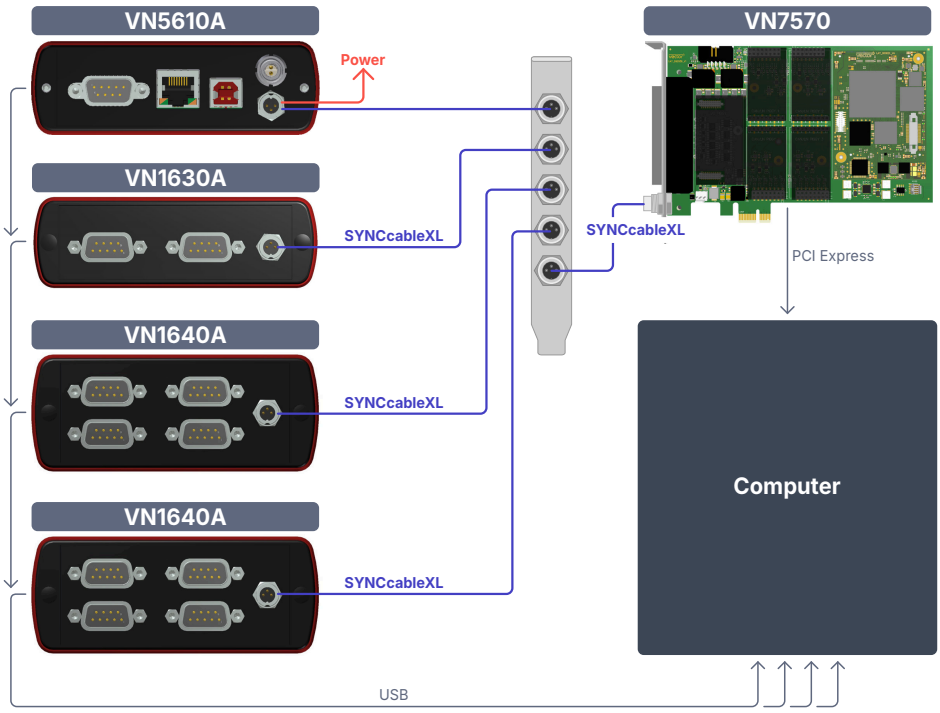
Pin	Assignment (all Binder connectors)
1	Not connected
2	Sync
3	Ground



Note

Within the sync system, up to five devices can be synchronized. Cascading of multiple Multi SYNCboxes to increase the number of devices is not possible.

Example


VN5610A
Power
VN7570
VN1630A
SYNCcableXL
SYNCcableXL
PCI Express
VN1640A
SYNCcableXL
Computer
VN1640A
SYNCcableXL
USB

8.3.3 Multi SYNCbox Active

Synchronization distributor

Description	Active synchronization distributor in plastic case. For five or more Vector devices.
Connectors	12x male 3-pin connector (Binder type 711)
Part number	05112



SYNC in/out

Pin	Assignment
1	Not connected
2	Synchronization line
3	Ground



DC in

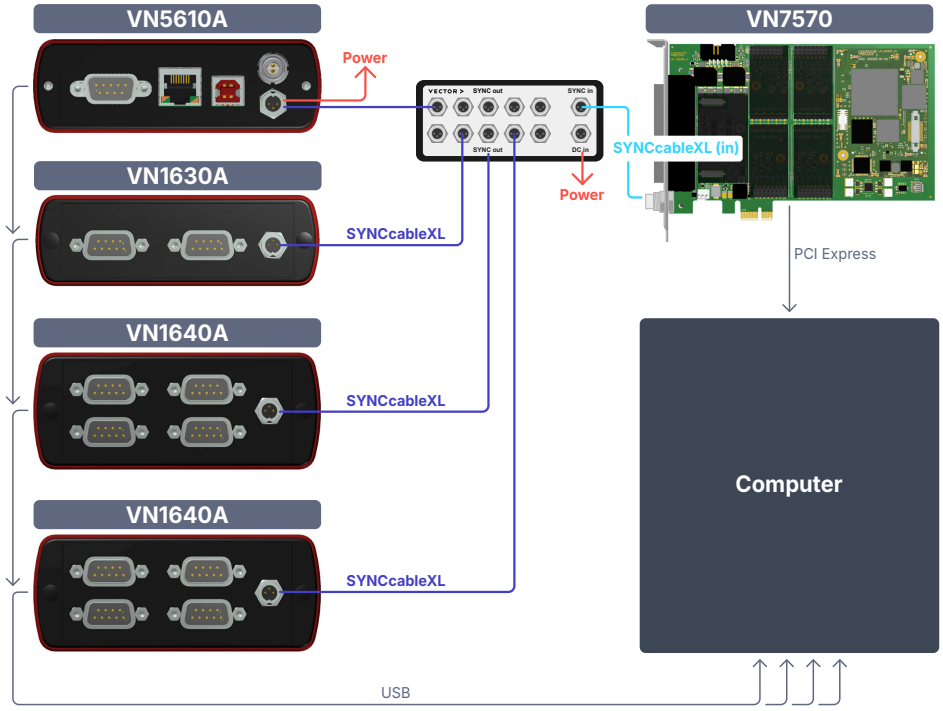
Pin	Assignment
1	Power supply (5 V ... 60 V DC, typ. 12 V)
2	Not connected
3	Ground



Note

Cascading of multiple Multi SYNCboxes active to increase the number of SYNC out is not possible.

Example


VN5610A
Power
VN7570
VN1630A
SYNCcableXL
SYNCcableXL (in)
Power
PCI Express
VN1640A
SYNCcableXL
Computer
VN1640A
SYNCcableXL
USB

9 Miscellaneous

In this chapter you find the following information:

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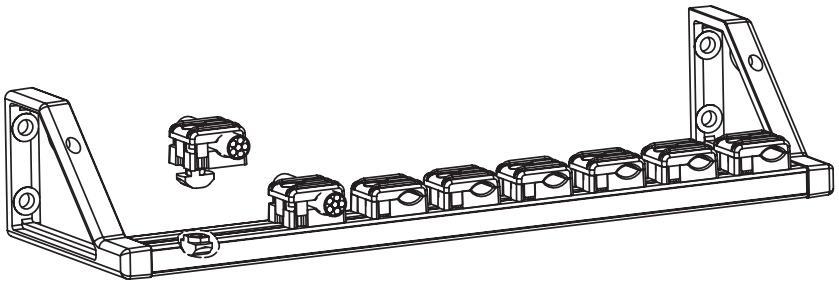
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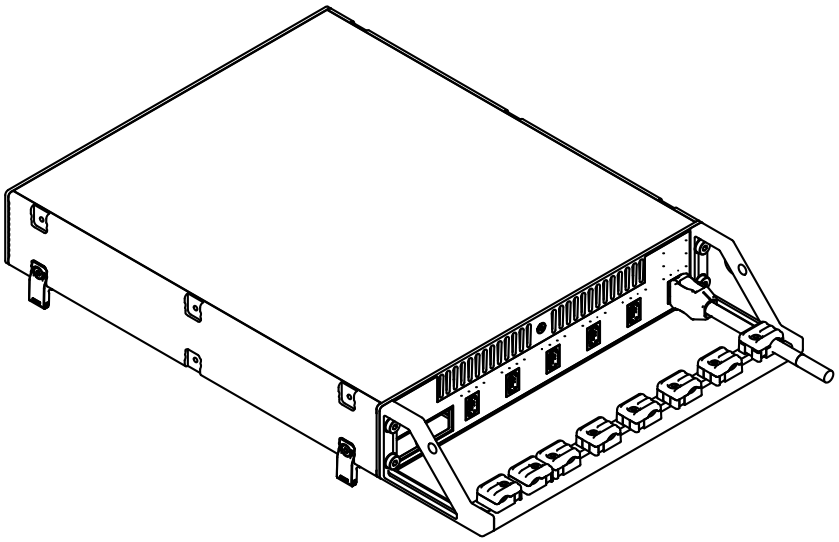
9.1 Mounting Equipment

9.1.1 VSH Cable Guard 216

Technical data

Description	Cable support system including eight clips for clamping single cables. For cable diameters (clamping range) from Ø 3.8 mm to Ø 6.8 mm.
Part number	05149





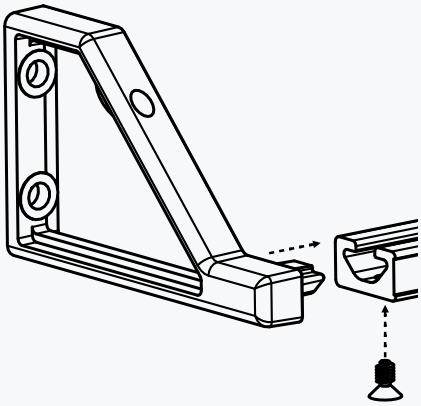
Note

The VSH Cable Guard 216 and the clips are not designed for use with VNcable 3Y.

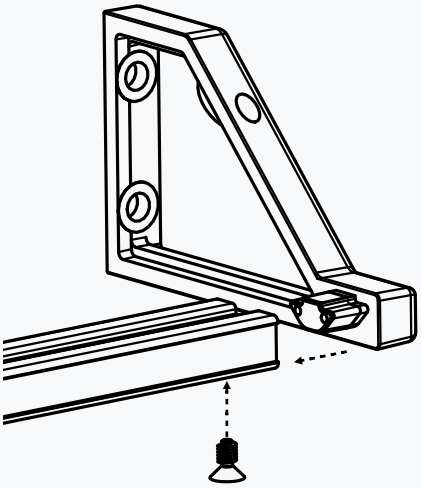
Example

The following steps describe the mounting of the VSH Cable Guard 216:

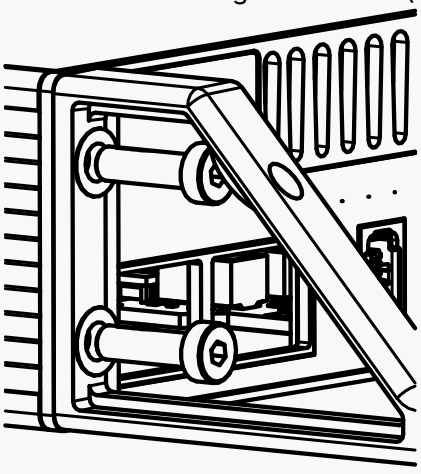
1. Insert the left frame into the cable rail and tighten the screw (Torx 8) with a torque of 1.4 Nm.



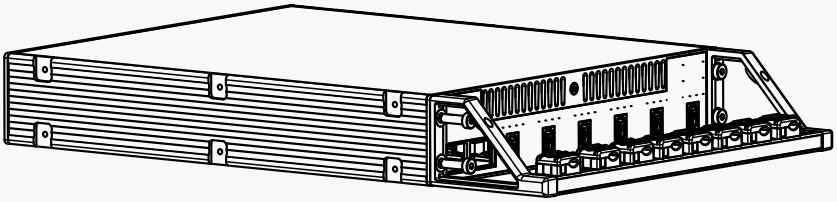
2. Repeat the steps above with the right frame.



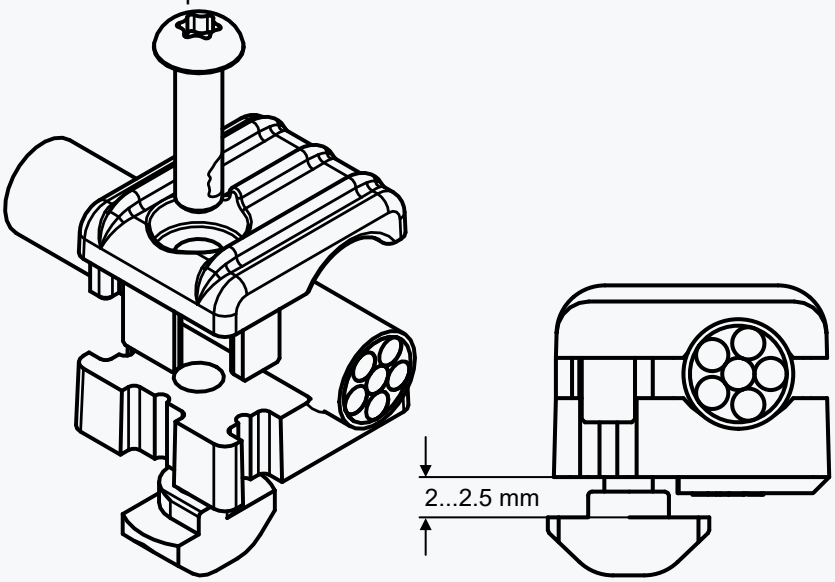
3. Attach the complete Cable Guard to the VN device and tighten it with the enclosed hexagonal screws (3 mm) and with a torque of 1.7 Nm.



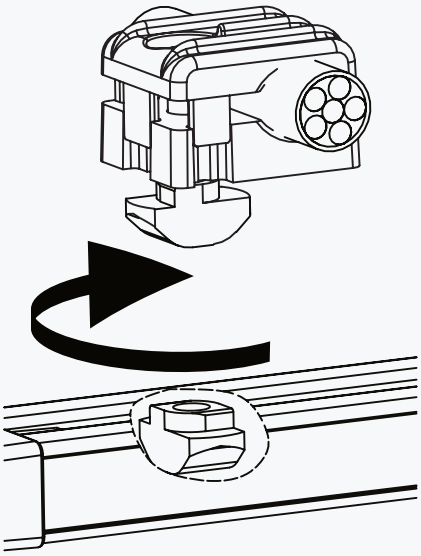
4. Repeat the steps on the other side.



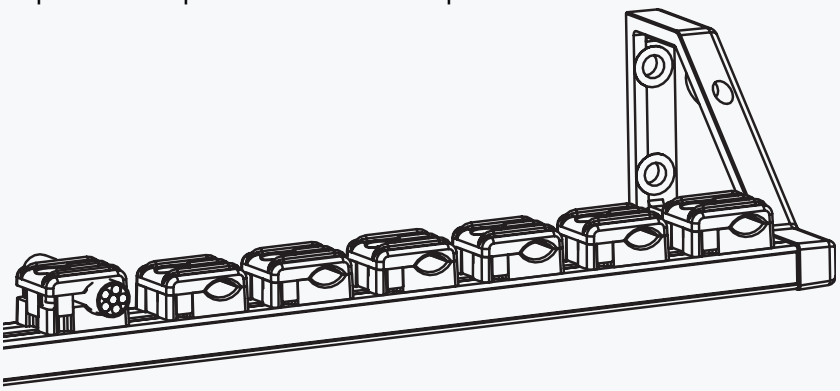
5. Lead the individual cables through the clamps and tighten the individual clamps depending on the cable (Torx 10). Tighten the screw only enough to leave a gap of 2 to 2.5 mm between the slot nut and the cable clamp.



6. Now insert the individual clamps into the Cable Guard and tighten the screw completely. The slot nut will rotate 90° inside the rail and thus fix the entire clamp.



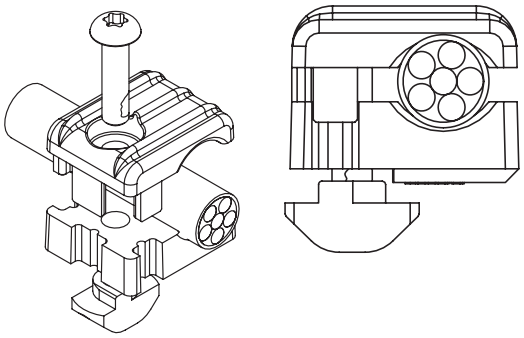
7. Repeat the steps with all other clamps.



9.1.2 VSH Cable Guard 216 Clip

Technical data

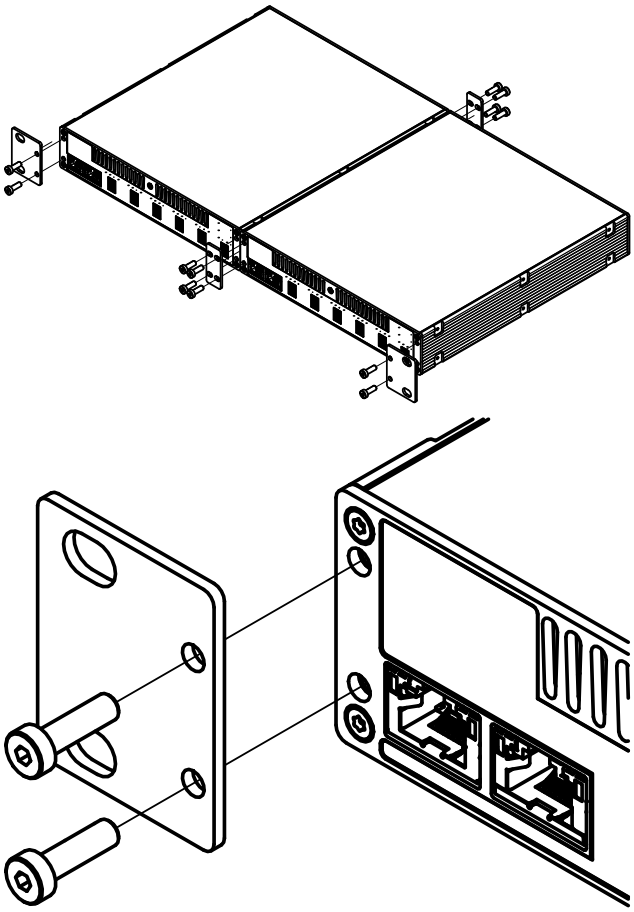
Description	Set of four single clips for VSH Cable Guard 216 (see section VSH Cable Guard 216 on page 208). For single cables.
Part number	05148



9.1.3 VSH Connection Kit 19"

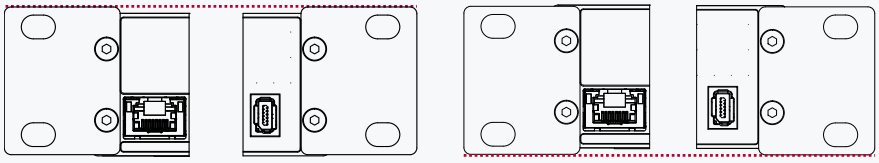
Technical data

Description	Brackets for 19" rack mounting (front and back mounting plates required, see VSH Connection Kit Horizontal on page 215).
Part number	05151



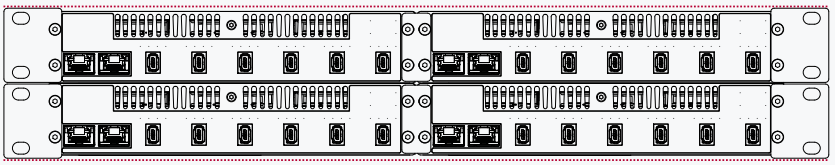
WARNING!

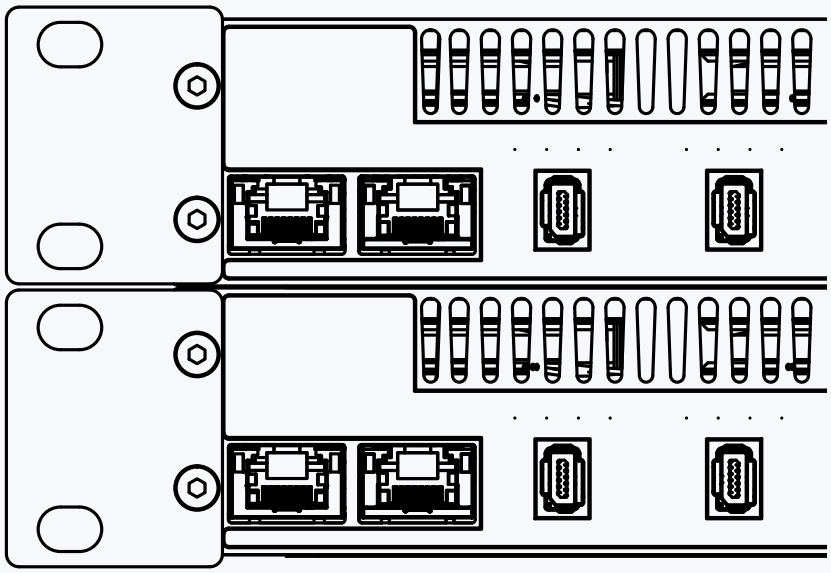
To avoid mechanical damage to the accessories, the unit or the installation, make sure that the two mounting brackets are always mounted in alignment (either top or bottom):



Note

For mounting two devices on top of each other, the rack brackets must be aligned accordingly. The rack brackets must not overlap between the devices!





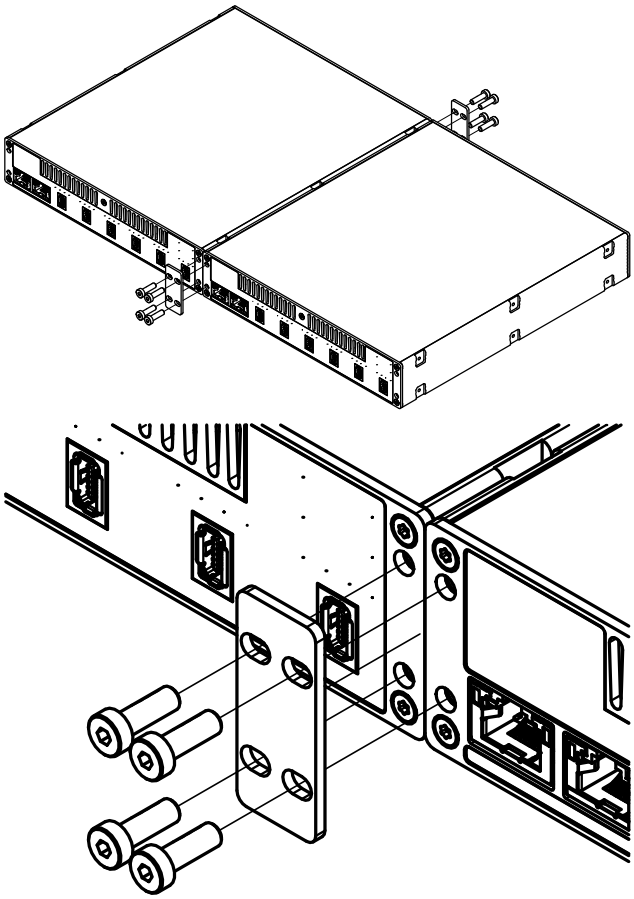
Note

- Elements may only be used for Vector devices in the Vector System Housing form factor.
- Always use both supplied elements and associated screws for mounting.
- For systems up to max. 20 kg.
- For mounting on a 19" rack, suitable screws must be selected to ensure permanent fixing according to the expected load (not included in the scope of delivery).
- In case of uncertainty and questions, please contact qualified personnel.
- Tightening torque: hexagon socket 3 mm, 1.7 Nm.

9.1.4 VSH Connection Kit Horizontal

Technical data

Description	Mounting plates for connecting two devices side by side (horizontally). The mounting is done on the front and back side of the devices.
Part number	05153



Note

> Elements may only be used for Vector devices in the Vector System Housing form factor.

> Always use both supplied elements and associated screws for mounting.

> For systems up to max. 20 kg.

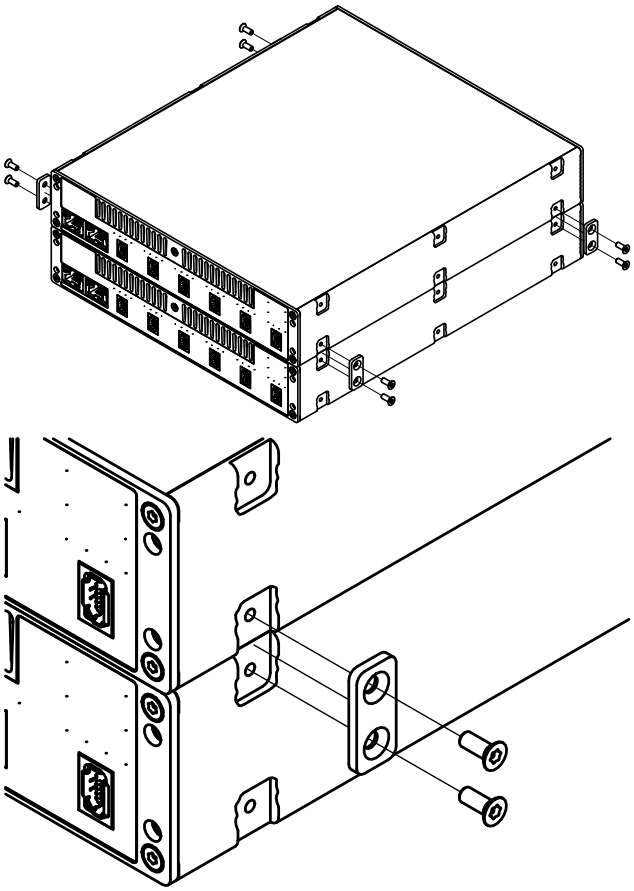
> In case of uncertainty and questions, please contact qualified personnel.

> Tightening torque: hexagon socket 3 mm, 1.7 Nm.

9.1.5 VSH Connection Kit Vertical

Technical data

Description	Four small mounting plates for connecting two devices on top of each other (vertically). Mounting is done on the left and right side of the housing.
Part number	05152



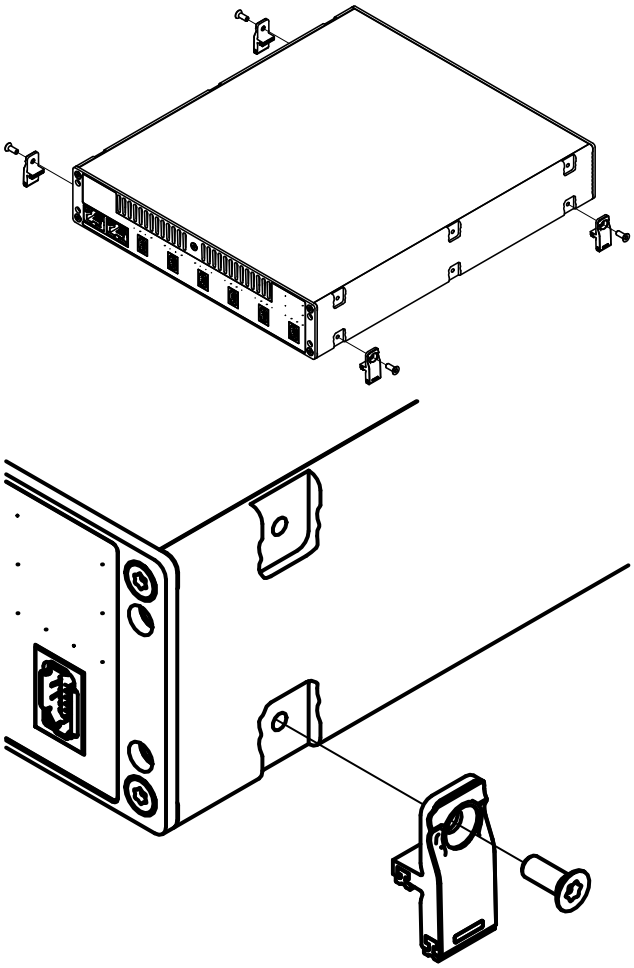
Note

- Elements may only be used for Vector devices in the Vector System Housing form factor.
- Always use all supplied elements and associated screws for mounting.
- For systems up to max. 20 kg.
- In case of uncertainty and questions, please contact qualified personnel.
- Tightening torque: Torx T10, 1.2 Nm.

9.1.6 VSH Equipment Foot Kit

Technical data

Description	Four spare mounting feet.
Part number	05150



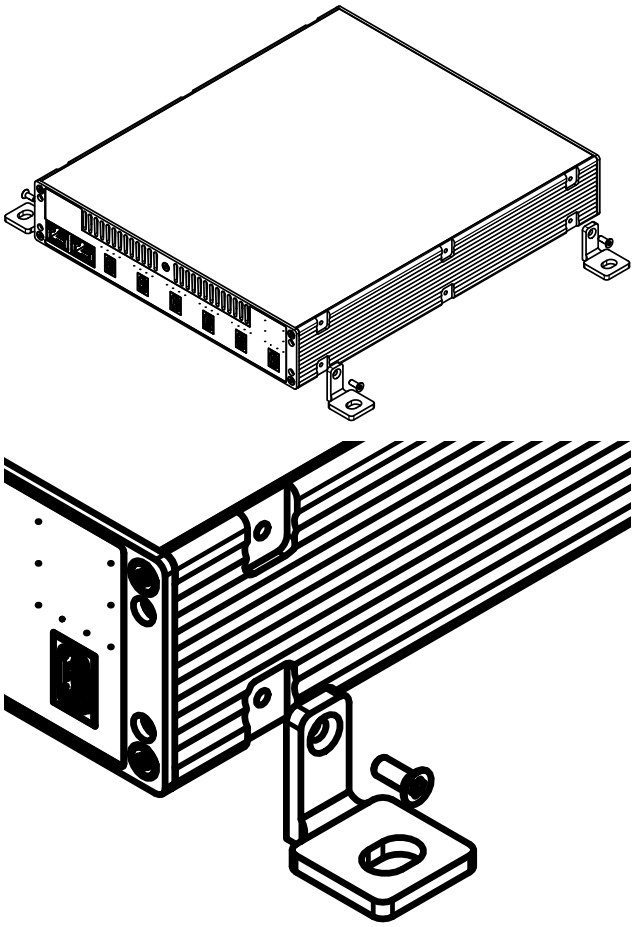
Note

- Elements may only be used for Vector devices in the Vector System Housing form factor.
- Always use all supplied elements and associated screws for mounting.
- For systems up to max. 20 kg.
- In case of uncertainty and questions, please contact qualified personnel.
- Tightening torque: Torx T10, 0.5...0.9 Nm.

9.1.7 VSH Mounting Flange Kit

Technical data

Description	Four mounting brackets. Allows fixing the device to a suitable surface.
Part number	05147



Note

- Mounting brackets may only be used for Vector devices in the Vector System Housing form factor.
- Always use all 4 brackets incl. screws for mounting.
- For systems up to max. 20 kg.
- For fixing the mounting brackets to the floor, wall or ceiling, suitable screws must be selected to ensure permanent fixing according to the expected load (not included in the scope of delivery).
- In case of uncertainty and questions, please contact qualified personnel.
- Tightening torque: Torx T10, 1.2 Nm.

9.1.8 Fix Kit 32mm Device

Technical data

Description	Fixing kit containing 4 pcs. of wall brackets for ALUbos housing incl. seals and screws. Suitable for VN1630A or VX1060 housing height.
Part number	07139



Note

- The Fix Kit may only be used for Vector devices.
- Always use all 4 brackets incl. screws for mounting.
- For devices up to max. 5 kg.
- For fixing the mounting brackets to the floor, wall or ceiling, suitable screws must be selected to ensure permanent fixing according to the expected load (not included in the scope of delivery).
- In case of uncertainty and questions, please contact qualified personnel.

9.1.9 Fix Kit 42mm Device

Technical data

Description	Fixing kit containing 4 pcs. of wall brackets for ALUbos housing 1040 incl. seals and screws. Suitable for VN1640A housing height.
Part number	07188



Note

- The Fix Kit may only be used for Vector devices.
- Always use all 4 brackets incl. screws for mounting.
- For devices up to max. 5 kg.
- For fixing the mounting brackets to the floor, wall or ceiling, suitable screws must be selected to ensure permanent fixing according to the expected load (not included in the scope of delivery).
- In case of uncertainty and questions, please contact qualified personnel.

9.1.10 Fix Kit Large Device

Technical data

Description	Fixing kit containing 4 pcs. of wall brackets for ALUbos housing 1600/1680 incl. seals and screws. Suitable for VN8900 or VX113x housing height.
Part number	07189



Note

- The Fix Kit may only be used for Vector devices.
- Always use all 4 brackets incl. screws for mounting.
- For devices up to max. 5 kg.
- For fixing the mounting brackets to the floor, wall or ceiling, suitable screws must be selected to ensure permanent fixing according to the expected load (not included in the scope of delivery).
- In case of uncertainty and questions, please contact qualified personnel.

9.2 Antennas

9.2.1 2.4 & 5 GHz Antenna SMA-R Std.

Technical data

Description	Standard antenna for EU, USA and other non-Asian countries. Suitable for 2.4 GHz and 5 GHz applications.
Part number	07169



Reference

A suitable antenna for Asian countries can be found section 2.4 & 5.2 GHz Antenna SMA-R Asia on page 222.

9.2.2 2.4 & 5.2 GHz Antenna SMA-R Asia

Technical data

Description	Standard antenna for Asia. Suitable for 2.4 GHz and 5.2 GHz applications.
Part number	07170



Reference

A suitable antenna for EU, USA and other non-Asia countries can be found section 2.4 & 5 GHz Antenna SMA-R Std. on page 222.

9.2.3 5.9 GHz DSRC Antenna SMA

Technical data

Description	Triton 5dBi DSRC 5.9GHz Dipole Terminal Antenna SMA(M). Hinged Connector for V2V and V2X Applications (5850-5925MHz DSRC band).
Dimensions	169 x 18 x 13 mm, Φ13 mm
Part number	07204

9.2.4 GNSS Antenna SMA

Technical data

Description	Low profile magnet mounted GPS-GLONASS-GALILEO positioning antenna
Length	3 m (RG174 Coax cable)
Part number	07205



9.3 SDHC/SDXC Memory Cards

9.3.1 SDHC Memory Card (XQI8C016Z) 32 GB

Technical data

Description	32 GB SDHC flash card (industrial grade) for: > VN8911 > VN8914 > VN8917
Part number	22370

9.3.2 SDXC Memory Card (GXQI8C016Z) 128GB

Technical data

Description	128 GB SDXC flash card (industrial grade) for: > VN8911 > VN8914 > VN8917
Part number	22371

9.4 CFast Card Reader USB 3.0 (external)

Technical data

Description	CFast Memory Card Reader USB 3.0
Part number	22268

9.5 Ser2K

Technical data

Description	Ser2K is an adapter cable for voltage level conversion from RS232 to K-Line (DIN9021)
Length	1.5 m
Connectors	1x female D-SUB9 connector 3x banana plug
Properties	Integrated voltage level converter in D-SUB connector. Tolerant against ground offset between computer and K-Line up to 30 V.
Conversion	RS232-K-Line-RS232 0 ... 150 kBaud
Supply voltage V_{batt}	6 V... 30 V
Operating temperature range	-20 °C ... +50 °C
Pull up on K-Line	1.2 k
Trigger threshold	30 % and 70 % V_{batt}
Part number	05051

Banana Plug	Assignment
Red	Power Supply / KL30
Blue	GND
Yellow	K-Line

9.6 Protection

9.6.1 USB Protector Type 1

Technical data

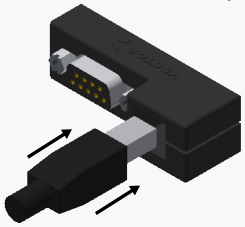
Description	Protection against mechanical damages at the USB connector of VN1630, VN1630A, VN1640 or VN1640A.
Part number	05142



Step by Step Procedure

The following steps describe the mounting of the USB Protector:

1. Insert the USB cable into the USB Protector. Therefore, loosen the screw of the clamp.



2. Attach the USB Protector to the Vector network interface and connect the D-SUB9 connector as well as the USB connector.

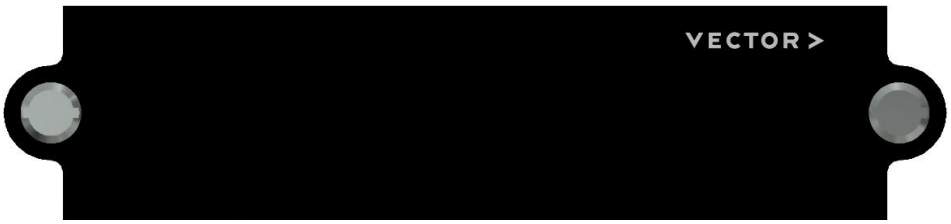


3. Tighten the screws of the D-SUB9 connector.
4. Tighten the screw to fix the USB connector.

9.6.2 Front Panel for VN8900

Technical data

Description	For use with VN8900 interface family without a slide-in module (e. g. VN8950, VN8970, VN8972)
Part number	07148



10 Important Notes - Details

In this chapter you find the following information:

10.1 Safety Instructions and Hazard Warnings **229**
10.2 Disclaimer **230**
10.3 CRA Related Information **231**
10.4 Disposal of Vector Hardware **232**

10.1 Safety Instructions and Hazard Warnings



WARNING!

This accessory is designed for the operation of a Vector interface which may control and/or otherwise influence the behavior of control systems and electronic control units. The operation of such interface may lead to serious hazards for life, body and property. In order to avoid personal injuries and damage to property, you have to read and understand the safety instructions and hazard warnings which are applicable for the interface prior to its installation and use. Keep this documentation (manual) and the documentation of the interface always near the interface.

10.2 Disclaimer



WARNING!

Claims based on defects and liability claims against Vector are excluded to the extent damages or errors are caused by improper use of the interface or use not according to its intended purpose. The same applies to damages or errors arising from insufficient training or lack of experience of personnel using the interface.

10.3 CRA Related Information

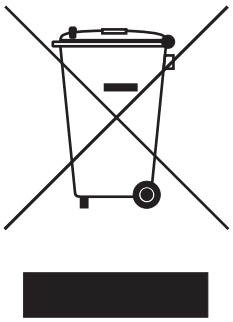
If you suspect a security vulnerability or want to report a security incident, please contact us at the address below or use the contact form on our website:

psirt@vector.com
www.vector.com

Vector Informatik GmbH
Ingersheimer Straße 24
70499 Stuttgart
GERMANY

10.4 Disposal of Vector Hardware

Please handle old devices responsibly and observe the environmental laws applicable in your country. Please dispose of the Vector hardware only at the designated places and not with the household waste.



Within the European Community, the Directive on Waste Electrical and Electronic Equipment (WEEE Directive) and the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS Directive) apply.

For Germany and other EU countries, we offer free take-back of old Vector hardware.

Please carefully check the Vector hardware to be disposed of before shipping. Please remove all items that are not part of the original scope of delivery, e.g. storage media. The Vector hardware must also be free of licenses and must no longer contain any personal data. Vector does not perform any checks in this regard. Once the hardware has been shipped, it cannot be returned to you. By shipping the hardware to us, you have relinquished your rights to the hardware.

Please register your old device via our website before shipping it.

11 Wichtige Hinweise

In diesem Kapitel finden Sie die folgenden Informationen:

11.1 Sicherheits- und Gefahrenhinweise **234**

11.2 Haftungsausschluss **235**

11.3 Informationen bezüglich CRA **236**

11.4 Entsorgung von Vector Hardware **237**

11.1 Sicherheits- und Gefahrenhinweise



WARNUNG!

Dieses Zubehör dient dem Betrieb eines Vector Interfaces, welches das Verhalten von Regelsystemen und Steuergeräten steuern und in anderweitiger Weise beeinflussen kann. Dadurch können erhebliche Gefahren für Leib, Leben und Eigentum entstehen. Um Personen- und Sachschäden zu vermeiden, müssen Sie vor der Installation und dem Einsatz eines solchen Interfaces die für dieses geltenden Sicherheits- und Gefahrenhinweise lesen und verstehen. Bewahren Sie sowohl diese Dokumentation (Handbuch) als auch die Dokumentation des Interfaces stets in der Nähe des Interfaces auf.

11.2 Haftungsausschluss



WARNUNG!

Soweit das Interface nicht sach- oder bestimmungsgemäß eingesetzt wird, über-nimmt Vector keine Gewährleistung oder Haftung für dadurch verursachte Schäden oder Fehler. Das Gleiche gilt für Schäden oder Fehler, die auf einer mangelnden Schulung oder Erfahrung derjenigen Personen beruhen, die das Interface einsetzen.

11.3 Informationen bezüglich CRA

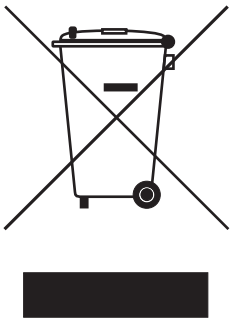
Wenn Sie eine Sicherheitslücke vermuten oder einen Sicherheitsvorfall melden möchten, kontaktieren Sie uns bitte über die unten angegebene Adresse oder über das Kontaktformular auf unserer Webseite:

psirt@vector.com
www.vector.com

Vector Informatik GmbH
Ingersheimer Straße 24
70499 Stuttgart
GERMANY

11.4 Entsorgung von Vector Hardware

Bitte gehen Sie verantwortungsvoll mit Altgeräten um und beachten Sie die in Ihrem Land geltenden Umweltgesetze. Entsorgen Sie die Vector Hardware bitte nur bei den dafür vorgesehenen Stellen und nicht über den Hausmüll.



Innerhalb der Europäischen Gemeinschaft gelten die Richtlinie über Elektro- und Elektronik-Altgeräte (WEEE-Richtlinie) und die Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten (RoHS-Richtlinie).

Für Deutschland und andere EU-Länder bieten wir Ihnen eine kostenlose Rücknahme der alten Vector Hardware an.

Bitte überprüfen Sie die zu entsorgende Vector Hardware vor dem Versand sorgfältig. Bitte entfernen Sie alle Gegenstände, die nicht zum ursprünglichen Lieferumfang gehören, z. B. Speichermedien. Die Vector Hardware muss außerdem frei von Lizenzen sein und darf keine personenbezogenen Daten mehr enthalten. Vector führt keine Kontrollen diesbezüglich durch. Sobald die Hardware versandt wurde, kann sie nicht mehr an Sie zurück geliefert werden. Mit dem Versand der Hardware an uns haben Sie Ihre Rechte an der Hardware abgetreten.

Bitte melden Sie vor dem Versand Ihr Altgerät über unsere Webseite an.

VECTOR >

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