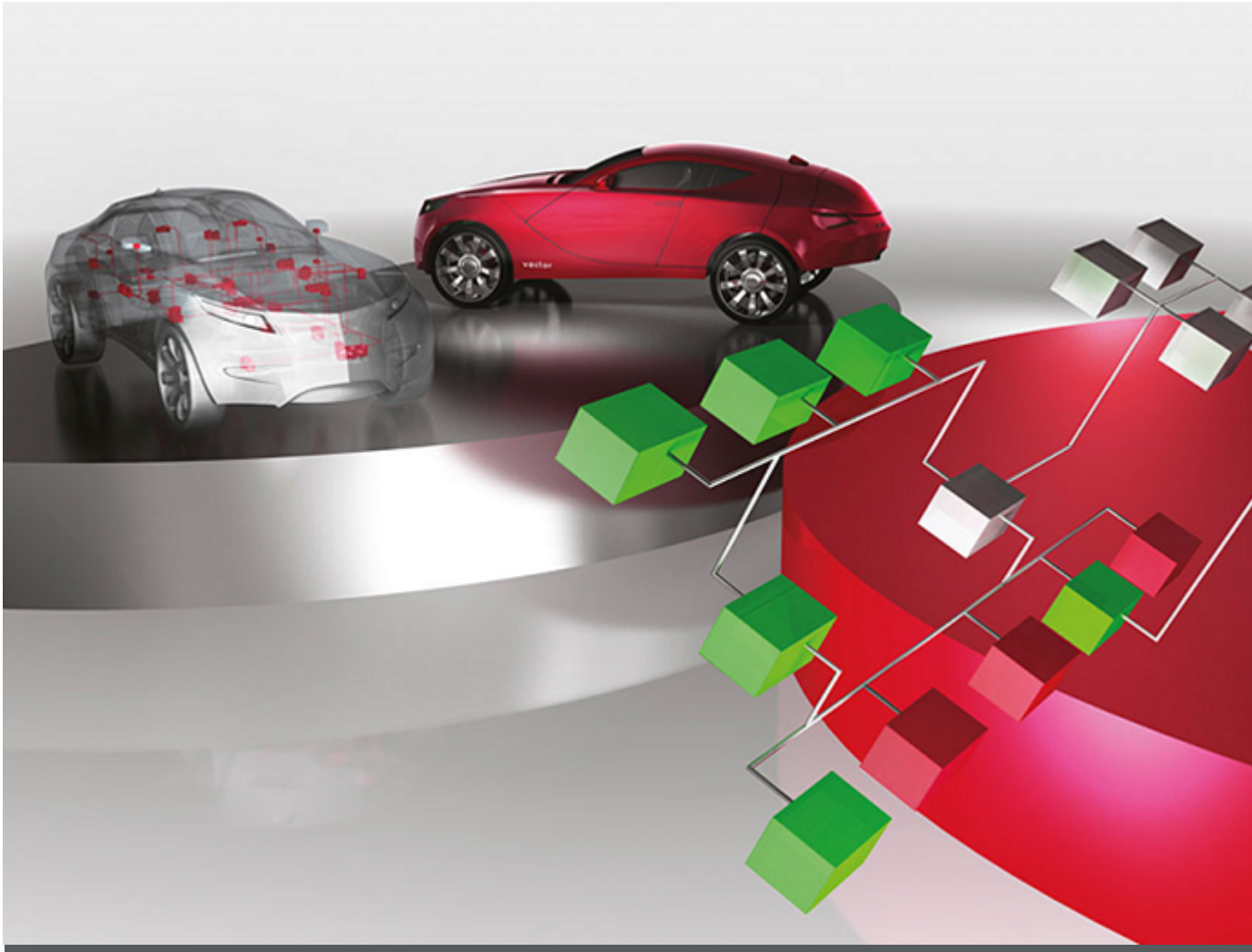
VECTOR



User Manual
CANoe/CANalyzer Option .Scope

Version 2.11
English

Imprint

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D-70499 Stuttgart

Table of Contents

1 Introduction

In this chapter you find the following information:

1.1 About this User Manual

1.1.1 Access Helps and Conventions

To find information quickly

The user manual provides you the following access helps:

- at the beginning of each chapter you will find a summary of its contents,
- in the header you see the current chapter and section,
- in the footer you see to which program version the user manual replies.

Conventions

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

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 commands
CANoe	Legally protected proper names and side notes.
`Source code`	File name and source code.
Hyperlink	Hyperlinks and references.
<STRG>+<S>	Notation for shortcuts.

Symbol	Utilization
	This icon indicates notes and tips that facilitate your work.
	This icon warns of dangers that could lead to damage.
	This icon indicates more detailed information.
	This icon indicates examples.
	This icon indicates step-by-step instructions.
	This icon indicates text areas where changes of the currently described file are allowed or necessary.
	This icon indicates files you must not change.
	This icon indicates multimedia files like e.g. video clips.
	This icon indicates an introduction into a specific topic.
	This icon indicates text areas containing basic knowledge.

Symbol	Utilization
	This icon indicates text areas containing expert knowledge.
	This icon indicates that something has changed.

1.1.2 Certification

Certified Quality Management System

Vector Informatik GmbH has ISO 9001:2008 certification. The ISO standard is a globally recognized quality standard.

1.1.3 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 damages which may result from the use of this documentation.

1.1.4 Support

You need support?

You can get through to our hotline at the phone number

+49 (711) 80670-200

or you send a problem report to the Vector Informatik GmbH Support.

1.1.5 Trademarks

Protected trademarks

All brand names in this documentation are either registered or non registered trademarks of their respective owners.

1.2 Product Overview

Features

The option .Scope is an integrated oscilloscope solution for CANoe and CANalyzer, based on USB scope hardware. A special Scope Trigger Y-Cable ensures that the scope hardware is time-synchronized with CANoe/CANalyzer and supports two different trigger concepts.

- Triggering on CAN/CAN FD, LIN and FlexRay bus events/errors using the sync line of Vector's interface hardware to externally trigger the scope hardware.
- Triggering on voltage edges of any I/O signal or bus signals using the scope hardware's internal triggers and the arbitrary waveform generator output for the time synchronization.

This very powerful combination of an USB scope and CANoe/CANalyzer has many advantages over traditional oscilloscopes:

- Faster analysis and location of protocol errors
- Easier automation of physical layer tests including evaluation of the signal quality via bit masks

The option .Scope is available for all CANoe/CANalyzer variants with exception of CANoe pex.

Note: Only Vector PicoScope hardware with the code **034** are supported, see below.

PicoScope 5444D-034

Supported hardware

The hardware PicoScope 5444D-034 has 4 analog input channels and is triggered using the sync line of Vector's interface hardware. Following channel configurations are supported:

- Up to 2 CAN/CAN FD/FlexRay
- Up to 4 LIN/A429

Requirements

- CANoe or CANalyzer version **8.2** or **higher**
- Valid software and hardware license for option .Scope

Scope of delivery

- PicoTech USB 3.0 scope hardware PS5444D-034 (200 Mhz)
- PicoTech USB cable standard (1.8 m)
- PicoTech USB Y-cable (1.8 m)
- PicoTech DC power supply with country-specific adapters
- 4x PicoTech oscilloscope probes TA386
- Vector user manual for option .Scope

Recommended Vector hardware

- 2x Vector Scope Bus Probe 300 MHz with adjustment tool
- 1x Vector Scope Trigger Y-Cable (1.5 m)

Note: A Vector interface hardware for CAN/LIN with a hardware sync connector is required to trigger the scope hardware. The VN1610, VN1611 and VN7610 do not have such a connector and are therefore not supported by the option .Scope.

2 Installation

In this chapter you find the following information:

2.1 Software Requirements

Operating system

- Windows 10 (requires CANoe or CANalyzer version 8.5 or higher)
- Windows 8.1 (requires CANoe or CANalyzer version 8.2 or higher)
- Windows 8 (requires CANoe or CANalyzer version 8.1 or higher)
- Windows 7

CANoe/CANalyzer version

- CANoe or CANalyzer version 8.2 (or higher) is required

PicoScope version

Latest PicoScope software from Pico Technology.

2.2 Software Installation

Install

Please ensure that you have administrator access rights for your computer before following the installation steps below:

1. First install or update your CANoe or CANalyzer to version 8.2 or higher.

Note: Please first ensure that you have a valid license for the option .Scope.

2. Make sure the CANoe and CANalyzer application is closed.
3. Now install the latest version of PicoScope by downloading the software from Pico Technology: http://www.picotech.com/download.html

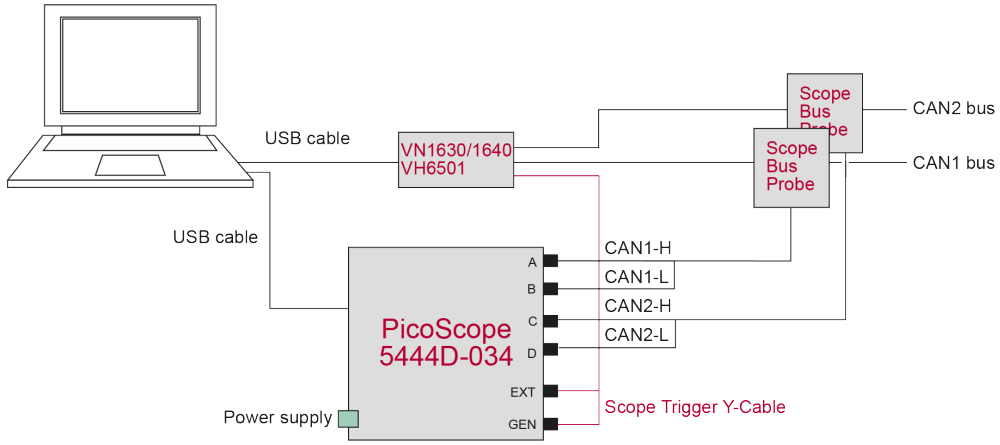
Note: Please install the PicoScope software before connecting the USB scope to your computer. A system restart is recommended after installation of PicoScope drivers.

Uninstall

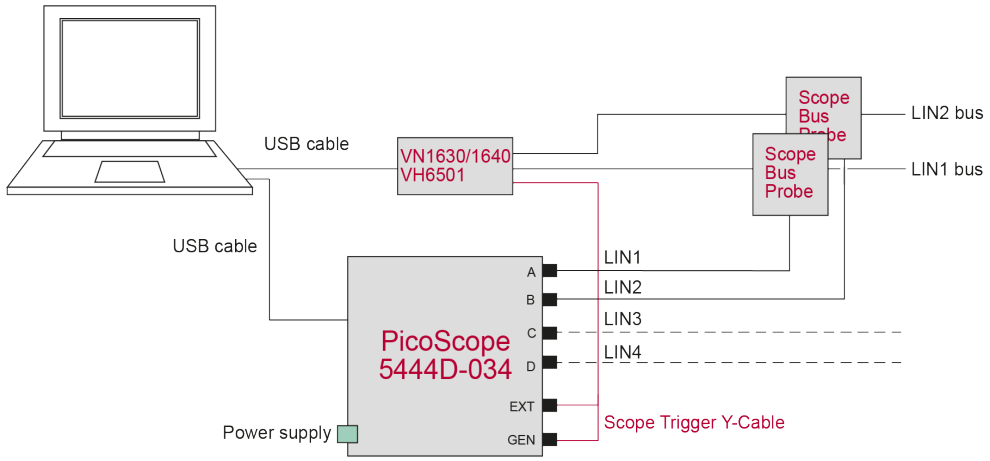
All drivers and applications can be uninstalled using the standard Windows mechanism.

2.3 Hardware Installation

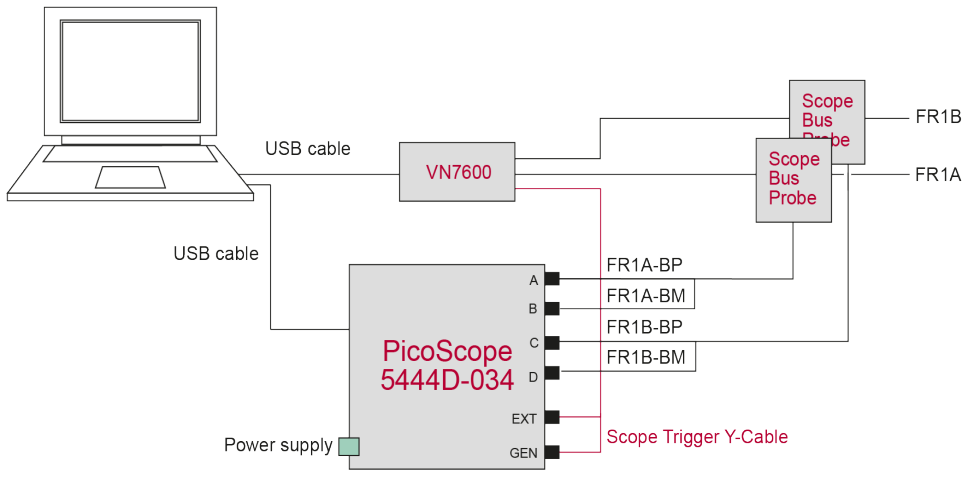
Hardware connections CAN/CAN FD



Hardware connections LIN



Hardware connections FlexRay



Note:

> PicoScope 5444D-034 must be externally powered in order to use the channels C and D.

Installation

After the software installation do the following steps:

USB Scope

1. Connect your USB scope to your computer using the USB cable provided.

   A product specification for the PS5444D-034 can found be in the PicoTech PDF manual for the PS5000 series.

Note: The PDF manual from PicoTech for the PS5000 series is automatically installed together with the PicoScope software.

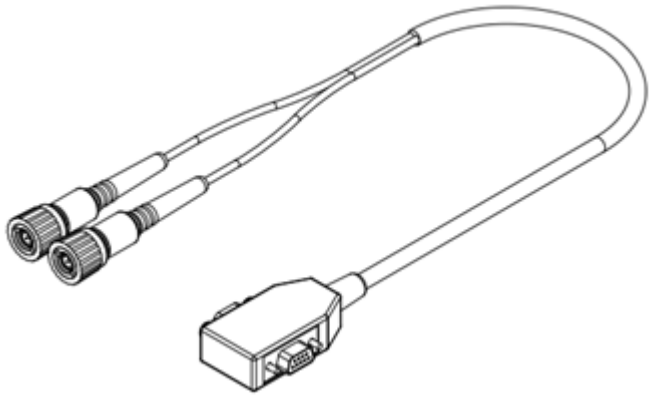
Scope Trigger Y-Cable

2. Please connect the sync line of your interface hardware to the scope's BNC EXT and GEN using Vector's Scope Trigger Y-Cable.

Note: If you are using a CANcardXL or CANcardXLe you will need a SyncBox XL.

Scope Bus Probe

3. To connect your USB scope to your interface hardware and to your CAN/CAN FD, LIN or FlexRay bus, please use Vector's Scope Bus Probe.



Note: You will need a separate Scope Bus Probe for each bus channel.

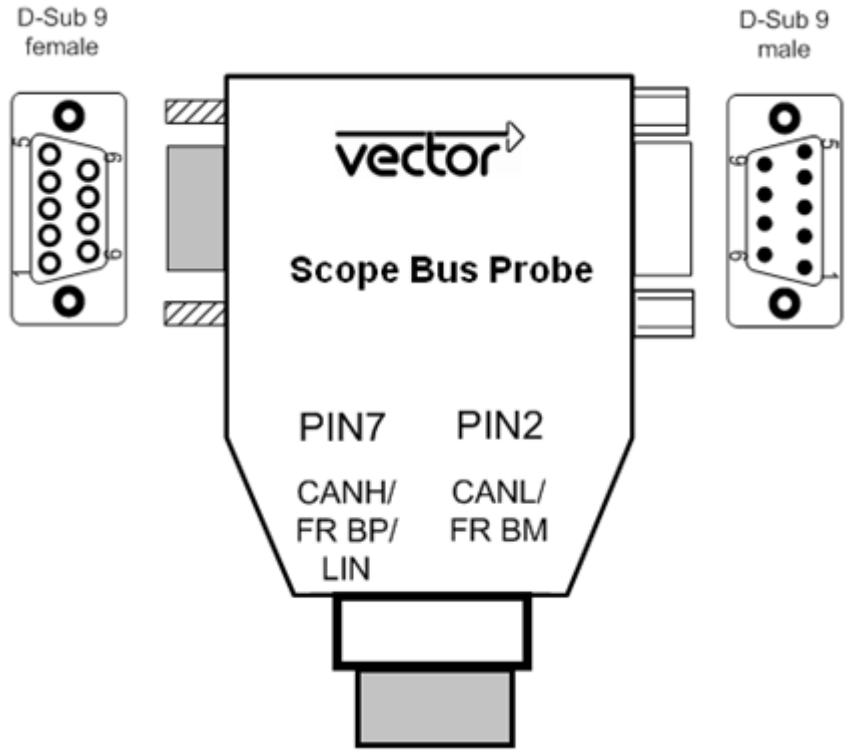
4. The female D-Sub connector of the Scope Bus Probe can be connected directly to your interface hardware.

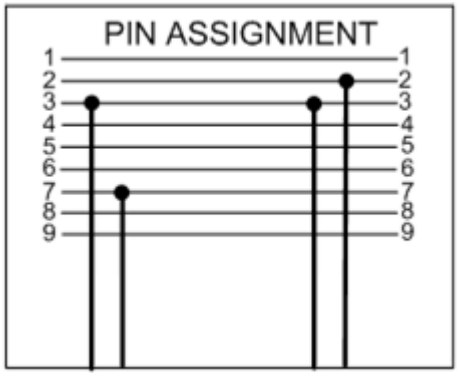
Note: All pins of the D-Sub connectors are connected 1:1 with each other. This allows you to easily externally power your LINcab or LINpiggy.

5. The male D-Sub connector should be connected to your CAN/LIN/FlexRay bus.
6. The Scope Bus Probe's BNCs labeled CANH and CANL should be connected to the BNCs of the scope hardware:
   - > CAN1: A (CANH) and B (CANL)
   - > CAN2: C (CANH) and D (CANL)
   - > LIN1, LIN2: A and B
   - > LIN3, LIN4: C and D
   - > FR1A: A (FR BP) and B (FR BM)
   - > FR1B: C (FR BP) and D (FR BM)

Caution: The Scope Bus Probe is specially designed and adjusted for the PS5444D-034. Please do not use any other cables to connect the scope hardware to your CAN/LIN/FlexRay bus.

Pin layout





- All 9 pins of the D-Sub-connectors are connected 1:1.
- The shield of the cables is connected to the GND (pin 3) of the D-Sub-connectors.
- The cable labeled **CANL/FR BM** is connected to pin 2 of the D-Sub-connectors via a 10:1 attenuator.
- The cable **CANH/FR BP/LIN** is connected to pin 7 of the D-Sub-connectors via a 10:1 attenuator.

Note: The attenuator is not switchable.

2.3.1 Vector Scope Bus Probe Calibration

Calibration

The Vector Scope Bus Probe is designed to match the input of your PicoScope model.

However, there are slight variations from oscilloscope to oscilloscope.

An uncompensated probe can lead to various measurement errors, especially in measuring pulse rise/fall times.

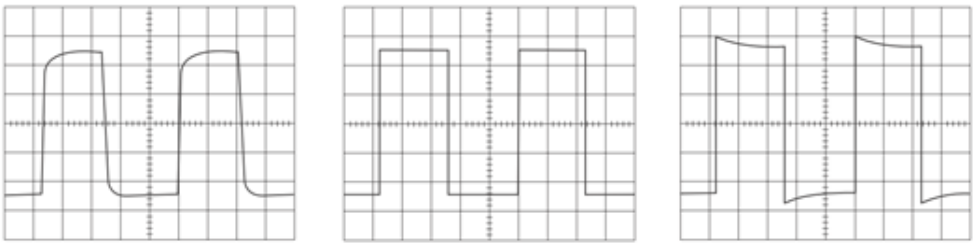
To deal with this, Vector Scope Bus Probe has a built-in compensation network.

You can adjust this network to compensate the Vector Bus Probe for the oscilloscope channel that you are using.

To do this, please apply the following steps:

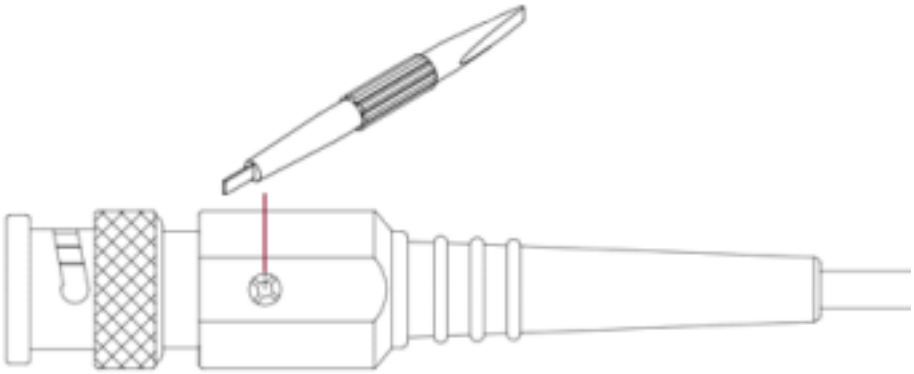
1. Attach the Vector Scope Bus Probe to your oscilloscope
2. Run the PicoScope software
3. Generate a rectangular signal source for the calibration process. You can use PicoScope's built-in signal generator for this.

Signal curve



4. Use the adjustment tool provided with the probe to adjust the compensation network to obtain a rectangular signal run that has flat tops with no overshoot.

Adjustment tool



Note: A connection cable between the generator output BNC and the Vector Bus Probe is not included in standard scope of delivery.

2.3.2 Scope Operations with VN8900, VT System and CANoe RT

Overview

For scope operations in a distributed CANoe environment (RT computer or VN8900 HW interface), PicoScope must be connected to GUI computer and not to RT computer or VN8900.

Note: For VN8900 hardware family, VT System and CANoe RT .Scope option is not supported in standalone mode.
For VT Systems a special Scope Trigger Y-Cable is required. If required, please contact Vector support.

Required hardware

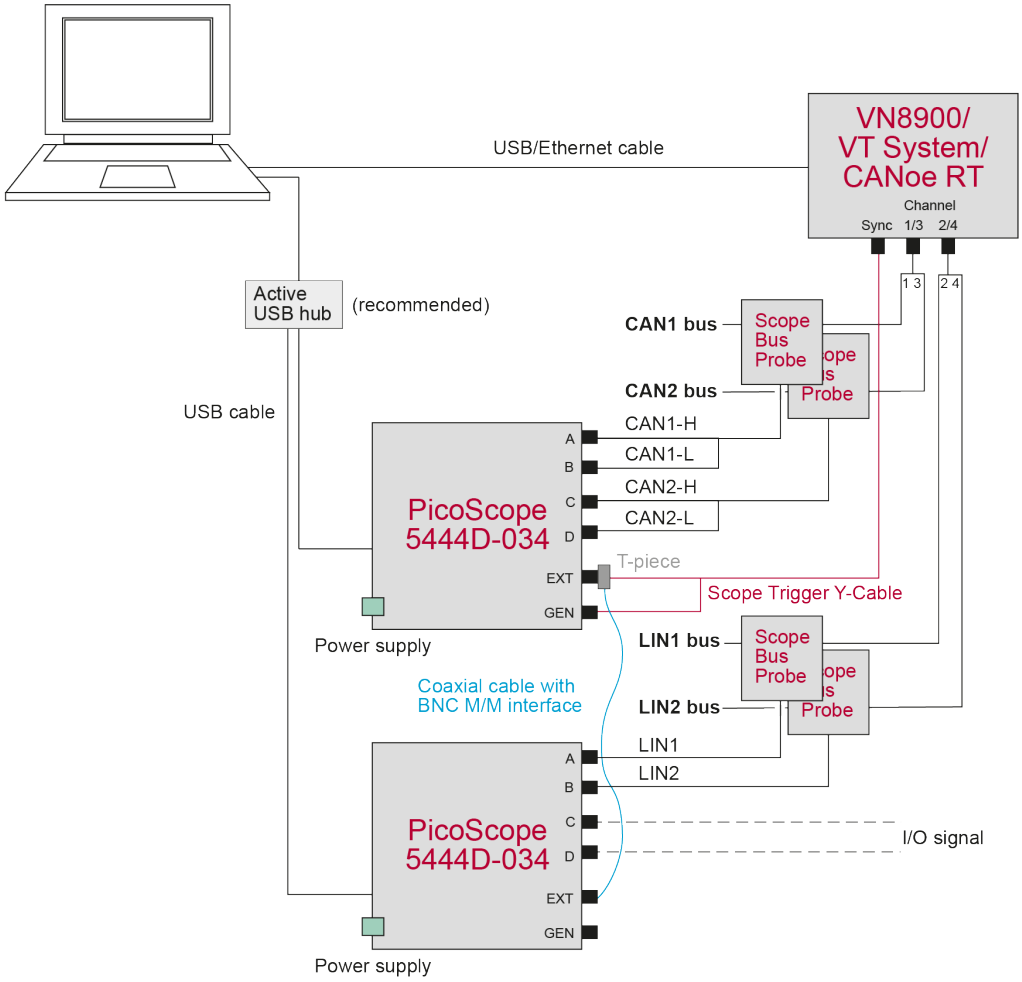
The following hardware is required for the multi-scope operations (**N** = number of used scopes):

- **N** oscilloscopes with **N** USB cables
- **N** Vector Scope Bus Probes
- **1** Vector Scope Trigger Y-Cable

The following items are not included in standard scope of delivery:

- **N-1** BNC-F/M/F-T-pieces 50 Ω
- **N-1** coaxial cables with M/M BNC 50 Ω interface (length up to 1m). This cable is used to connect the BNC-T piece with the Ext-Trigger BNC.

Hardware connections



2.3.3 Multi-Scope Operations

Required hardware

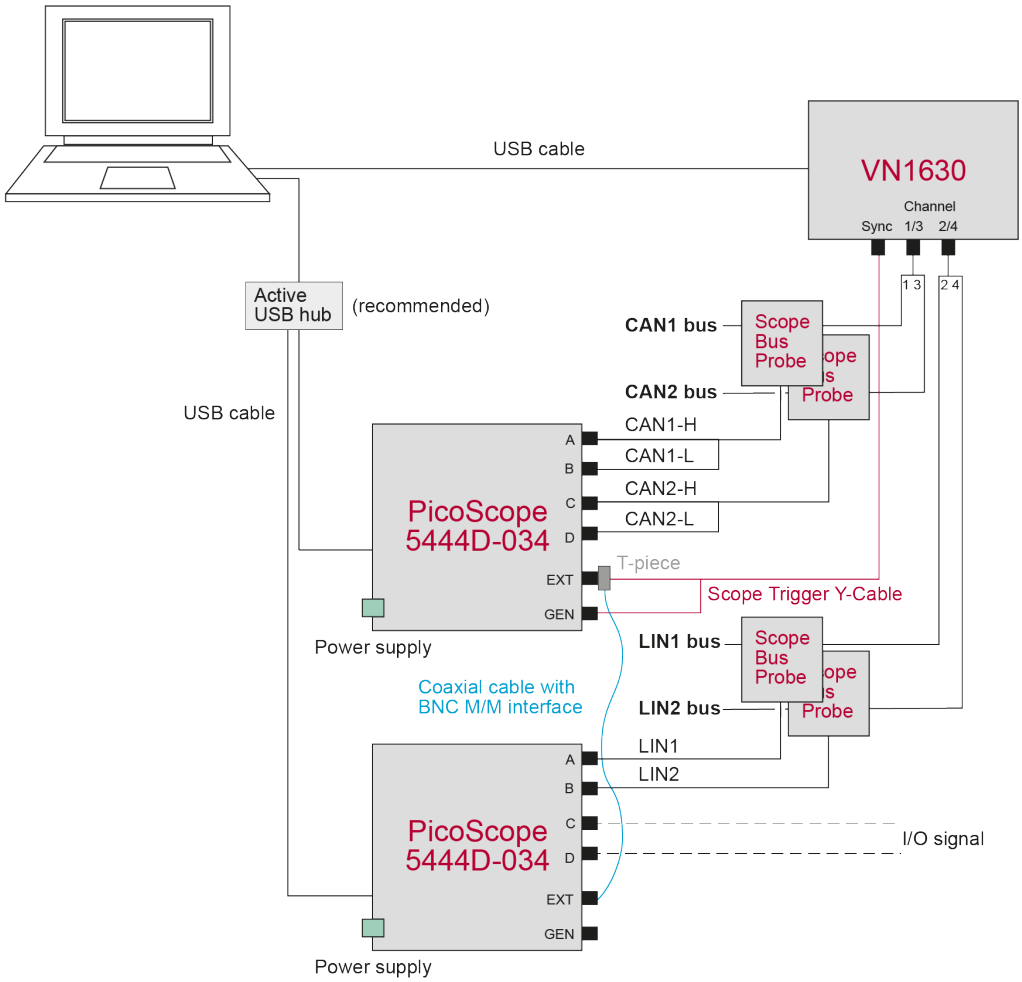
The following hardware is required for the multi-scope operations (**N** = number of used scopes):

- **N** oscilloscopes with **N** USB cables
- **N** Vector Scope Bus Probes
- **1** Vector Scope Trigger Y-Cable

The following items are not included in standard scope of delivery:

- **N-1** BNC-F/M/F-T-pieces 50 Ω
- **N-1** coaxial cables with M/M BNC 50 Ω interface (length up to 1m). This cable is used to connect the BNC-T piece with the Ext-Trigger BNC.

Hardware connections



Note:

- Only bus specific trigger conditions are supported when multiple scopes are used.
- PicoScope 5444D-034 must be externally powered in order to use the channels C and D.
- For multi scope operations all scopes must have the same scope type i.e. model number (e.g. PS5444D-034).
- For multi scope operations the maximum number of connectable scopes is limited to four.

2.3.4 Scope Operations with CAN Disturbance Interface/FRstress

Required hardware

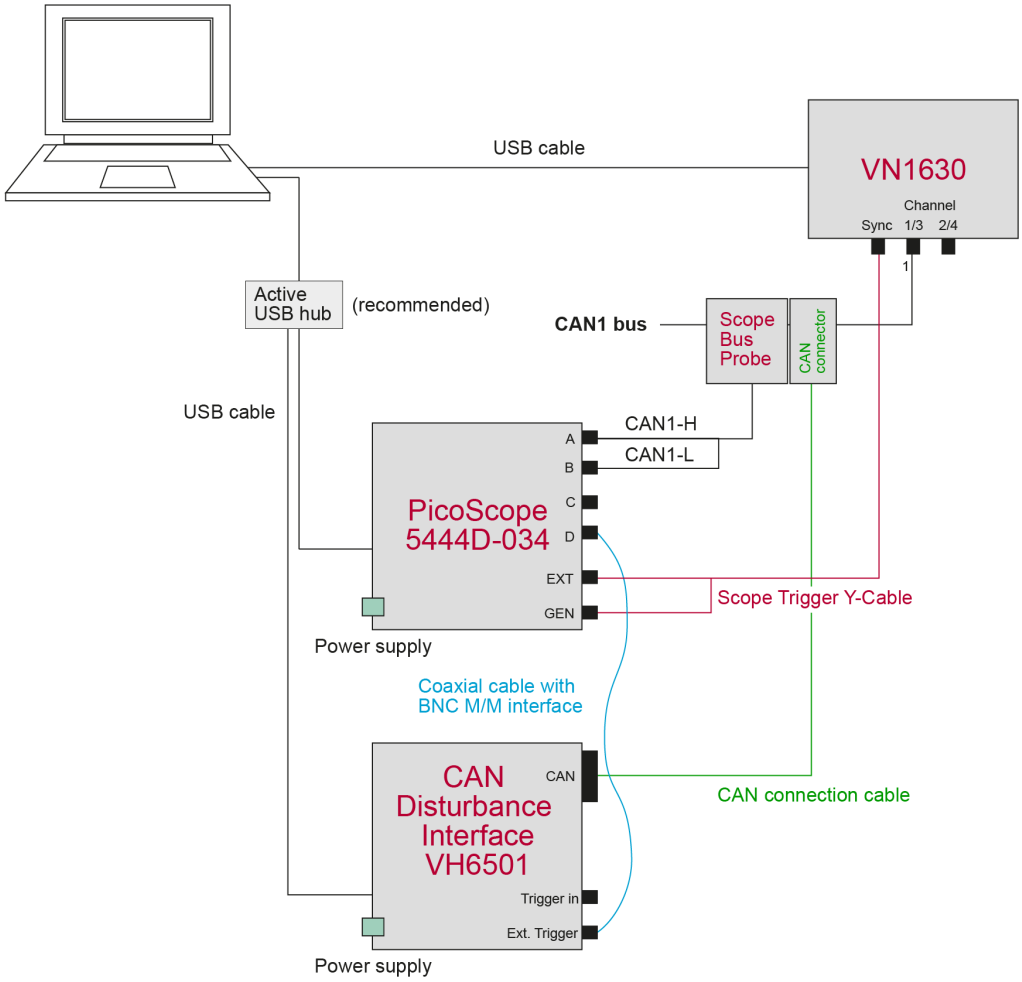
The following hardware is required for the scope operations with CAN Disturbance Interface VH6501[1]/FRstress:

- > **1** oscilloscope with USB cable
- > **1** Vector Scope Bus Probe
- > **1** Vector Scope Trigger Y-Cable

The following items are not included in standard scope of delivery:

- > **1** BNC-F/M/F-T-pieces 50 Ω
- > **1** coaxial cable with M/M BNC 50 Ω interface (length up to 1m). This cable is used to connect the BNC-T piece with the Ext-Trigger BNC.
- > **1** CAN Disturbance Interface VH6501/FRstress
- > **1** connection cable

Hardware connections (example CAN Disturbance Interface VH6501)



Note:

- > PicoScope 5444D-034 must be externally powered in order to use the channels C and D.

[1] CAN Disturbance Interface replaces CANstress

2.4 First Steps

First steps

1. Start CANoe or CANalyzer.

Note: Please first ensure that you have a valid license for the option .Scope.

2. Follow the first step instructions in the online help for the option .Scope.

Next steps

To make the maximum use of the option .Scope, please read the online help.

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