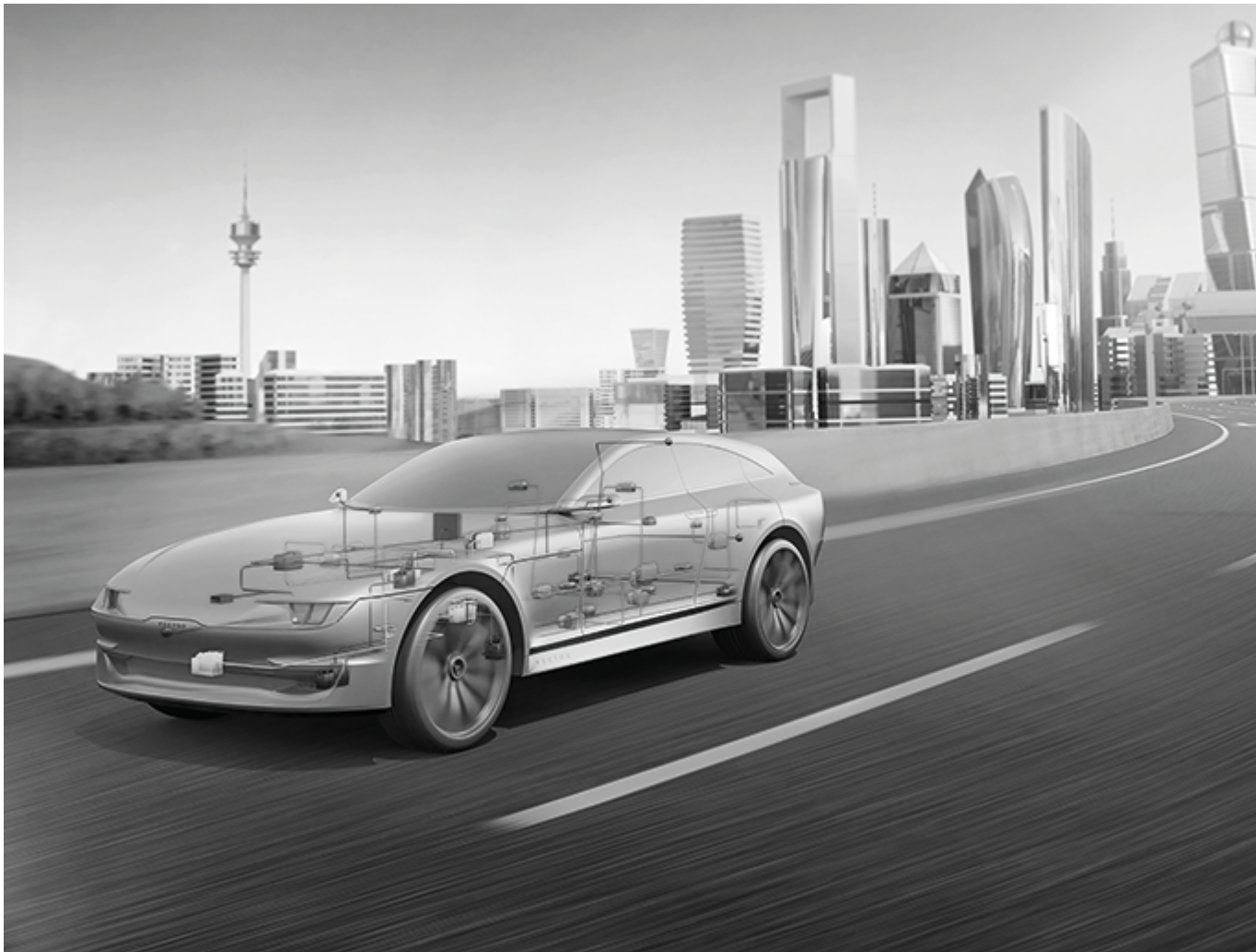




VH5110 CCS Listener User Manual

Version 1.2
English



Imprint

Vector Informatik GmbH
Ingersheimer Straße 24
D-70499 Stuttgart

Vector reserves the right to modify any information and/or data in this user documentation without notice. This documentation nor any of its parts may be reproduced in any form or by any means without the prior written consent of Vector. To the maximum extent permitted under law, all technical data, texts, graphics, images and their design are protected by copyright law, various international treaties and other applicable law. Any unauthorized use may violate copyright and other applicable laws or regulations.

© Copyright 2021 Vector Informatik GmbH. Printed in Germany.
All rights reserved.



Table of Contents

1 Introduction	4
1.1 Product Overview	5
1.2 Important Notes	6
1.2.1 Safety Instructions and Hazard Warnings	6
1.2.2 Proper Use and Intended Purpose	6
1.2.3 Hazards	6
1.2.4 Disclaimer	7
1.3 About This User Manual	8
1.3.1 Conventions	8
1.3.2 Certification	9
1.3.3 Warranty	9
1.3.4 Support	9
1.3.5 Trademarks	9
2 Connectors And Accessories	10
2.1 Connectors of the Front Site	11
2.1.1 RJ45 Ethernet Connector	11
2.2 Connectors of the Back Site	12
2.2.1 MQS Connector	12
2.2.2 BNC Connector	13
2.3 Accessories	14
2.3.1 Inductive Coupler	14
2.3.2 BNC Cable	15
3 Technical Data	16
3.1 Technical Data	17
4 Getting Started	18
4.1 Driver Installation	19
4.2 Device Configuration	19
4.3 PWM Measurement	19
4.3.1 Poll Mode	19
4.3.2 Push Mode	19
5 Index	20



1 Introduction

In this chapter you find the following information:

1.1 Product Overview	5
1.2 Important Notes	6
1.2.1 Safety Instructions and Hazard Warnings	6
1.2.2 Proper Use and Intended Purpose	6
1.2.3 Hazards	6
1.2.4 Disclaimer	7
1.3 About This User Manual	8
1.3.1 Conventions	8
1.3.2 Certification	9
1.3.3 Warranty	9
1.3.4 Support	9
1.3.5 Trademarks	9



1.1 Product Overview

With the VH5110 the communication, based on CCS protocols, between a charging station (EVSE) and an electric vehicle (EV) can be analyzed. The VH5110 listens to the data communicated on the Control Pilot line via PLC and converts it into Ethernet frames, which will be interpreted in CANoe. In addition, also the PWM parameters of the basic communication will be measured and displayed in CANoe as system variables.

The VH5110 offers the following features:

- ▶ portable and easy to use
- ▶ capable of listening to all data transmitted between EVSE and EV
- ▶ full support (SLAC and V2G) of DIN70121 and ISO15118 protocol
- ▶ measurement of voltage, frequency and duty cycle of the PWM communication according to IEC61851
- ▶ direct connection to the Control Pilot signal, no Man-in-the-middle is necessary
- ▶ indirect connection through inductive coupling possible
- ▶ passive behavior, no influence on charging communication
- ▶ fully compliant with the HPGP specification

Requirements

CANoe version 12.0 SP3 or later with

- ▶ option .Ethernet and
- ▶ option .SmartCharging

Scope of Delivery

- ▶ VH5110 CCS Listener
- ▶ Power supply cable for VH5110 (part number 05204)
- ▶ Quick Start Guide



1.2 Important Notes

1.2.1 Safety Instructions and Hazard Warnings

**Caution!**

In order to avoid personal injuries and damage to property, you have to read and understand the following safety instructions and hazard warnings prior to installation and use of this interface. Keep this documentation (manual) always near the interface.

1.2.2 Proper Use and Intended Purpose

**Caution!**

The interface is designed for analyzing, controlling and otherwise influencing control systems and electronic control units. This includes, inter alia, bus systems like CAN, LIN, K-Line, MOST, FlexRay, Ethernet, BroadR-Reach and/or ARINC 429.

The interface may only be operated in a closed state. In particular, printed circuits must not be visible. The interface may only be operated (i) according to the instructions and descriptions of this manual; (ii) with the electric power supply designed for the interface, e.g. USB-powered power supply; and (iii) with accessories manufactured or approved by Vector.

The interface is exclusively designed for use by skilled personnel as its operation may result in serious personal injuries and damage to property. Therefore, only those persons may operate the interface who (i) have understood the possible effects of the actions which may be caused by the interface; (ii) are specifically trained in the handling with the interface, bus systems and the system intended to be influenced; and (iii) have sufficient experience in using the interface safely.

The knowledge necessary for the operation of the interface can be acquired in work-shops and internal or external seminars offered by Vector. Additional and interface specific information, such as „Known Issues“, are available in the „Vector KnowledgeBase“ on Vector's website at www.vector.com. Please consult the „Vector KnowledgeBase“ for updated information prior to the operation of the interface.

1.2.3 Hazards

**Caution!**

The interface may control and/or otherwise influence the behavior of control systems and electronic control units. Serious hazards for life, body and property may arise, in particular, without limitation, by interventions in safety relevant systems (e.g. by deactivating or otherwise manipulating the engine management, steering, airbag and/or braking system) and/or if the interface is operated in public areas (e.g. public traffic, airspace). Therefore, you must always ensure that the interface is used in a safe manner. This includes, inter alia, the ability to put the system in which the interface is used into a safe state at any time (e.g. by „emergency shutdown“), in particular, without limitation, in the event of errors or hazards.

Comply with all safety standards and public regulations which are relevant for the operation of the system. Before you operate the system in public areas, it should be tested on a site which is not



accessible to the public and specifically prepared for performing test drives in order to reduce hazards.

1.2.4 Disclaimer

**Caution!**

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.



1.3 About This User Manual

1.3.1 Conventions

In the two tables below you will find the notation and icon conventions used throughout the manual.

Style	Utilization
bold	Fields/blocks, user/surface interface elements, window- and dialog names of the software, special emphasis of terms [OK] Buttons in brackets File Save Notation for menus and menu commands
Microsoft	Legally protected proper names
Source Code	File and directory names, source code, class and object names, object attributes and values
Hyperlink	Hyperlinks and references
<CTRL>+<S>	Notation for key combinations

Symbol	Utilization
	Dangers that could lead to damage
	Notes and tips that facilitate your work
	More detailed information
	Examples
	Step-by-step instructions
	Text areas where changes of the currently described file are allowed or necessary
	Files you must not change
	Multimedia files e.g. video clips



Symbol	Utilization
	Introduction into a specific topic
	Text areas containing basic knowledge
	Text areas containing expert knowledge
	Something has changed

1.3.2 Certification

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

1.3.3 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.

1.3.4 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.

1.3.5 Trademarks

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



2 Connectors And Accessories

In this chapter you find the following information:

2.1 Connectors of the Front Site	11
2.1.1 RJ45 Ethernet Connector	11
2.2 Connectors of the Back Site	12
2.2.1 MQS Connector	12
2.2.2 BNC Connector	13
2.3 Accessories	14
2.3.1 Inductive Coupler	14
2.3.2 BNC Cable	15



2.1 Connectors of the Front Site

2.1.1 RJ45 Ethernet Connector



Figure 1: VH5110 with RJ45 Ethernet connector

With the RJ45 Ethernet connector the VH5110 will be connected to the computer where CANoe is running. For this purpose a separate Ethernet adapter (e.g. Vector VN5610A) is necessary. Also the built-in Ethernet adapter of the computer can be used.

The VH5110 can also be used for logging of the charging communication. In this case the VH5110 will be directly connected to the Ethernet port of a suitable data logger. CANoe is then only used for later offline analysis.

The LEDs on the RJ45 socket indicate the following status:

Color	Activity	Description
Green	Turn on	100Base-TX
	Turn off	10Base-T
	Blinking	Transmitting/Receiving
Yellow	Turn on	Ethernet Link established
	Turn off	No Ethernet link established



2.2 Connectors of the Back Site



Figure 2: VH5110 with MQS and BNC connector

2.2.1 MQS Connector

With the MQS connector the VH5110 will be supplied with 12 V. The power supply cable is included in the scope of delivery.

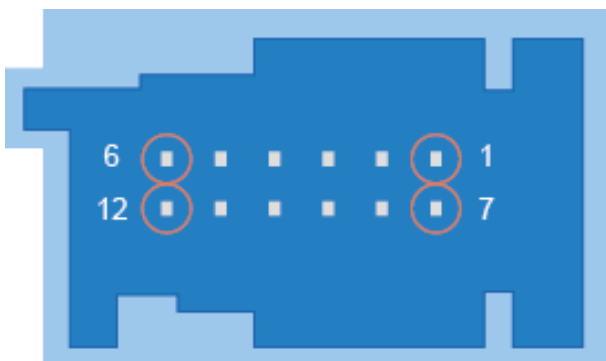


Figure 3: MQS Connector

Pin	Assignment	Pin	Assignment
1	Not used	7	Not used
2	GND	8	GND
3	Not used	9	Not used
4	Not used	10	Not used
5	Not used	11	Not used
6	GND	12	DC 12V

**Caution!**

The applied supply voltage has been within the range of 10.8V to 13.2V. Supply voltages beyond this range lead to a damage of the device.

2.2.2 BNC Connector

With the BNC connector the VH5110 can be connected to the Control Pilot (CP) signal and Protective Earth (PE) to listen to the communication. If there is no direct access to the CP and PE available e.g. at field analysis, an indirect connection is also possible by using an inductive coupler around the charging cable.

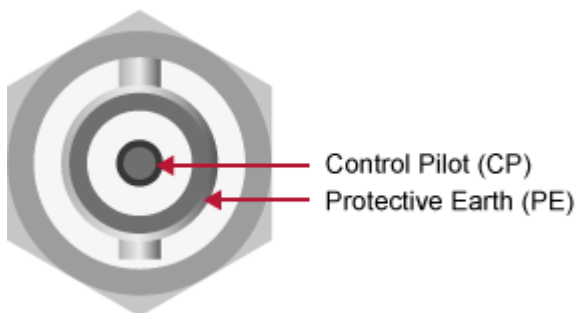


Figure 4: BNC connector

The impedance of the BNC cable shall be 50 Ohms. This cable is not in the scope of delivery but can be ordered separately. Please find more information in the chapter [2.3 Accessories](#).



2.3 Accessories

2.3.1 Inductive Coupler

For indirect access a special inductive coupler is necessary which is mounted around the charging cable.



Figure 5: Premo MICU 300A-S/LF

A suitable coupler with an integrated BNC connector is for example the Premo MICU 300A-S/LF.

This coupler is not contained in the scope of delivery but can be ordered separately under the part number 05212.



2.3.2 BNC Cable

For connecting the Control Pilot (CP) signal and Protective Earth (PE) to the VH5110 a BNC cable with the following specifications is available:

Parameter	Value
Cable ▶ Length ▶ Impedance	Approx. 70 cm 50 Ohms
VH5110 Connector ▶ Type	BNC male
DUT Connector ▶ Type ▶ Plug color Control Pilot (CP) ▶ Plug color Protective Earth (PE)	4mm Banana plug (2x) Blue Yellow

This BNC cable is not contained in the scope of delivery but can be ordered separately under the part number 05210.



3 Technical Data

In this chapter you find the following information:

3.1 Technical Data	17
---------------------------------	-----------



3.1 Technical Data

Parameter	Value Range
Power supply ▶ Connector type ▶ Voltage	MQS 12V DC +/-10%
Current consumption ▶ Average ▶ Peak	Typ. 800mW Typ. 1200mW
Host interface ▶ Interface type ▶ Connector Type ▶ Data rate	Ethernet RJ45 10/100 Mbit/s
Measurement connection ▶ Connector type ▶ Connector impedance	BNC female 50 Ohms
Start-up time (power-on to push first packet out) ▶ With fixed Ethernet speed ▶ With auto-negotiation	< 6 s < 8 s
Supported standards	HomePlug Green PHY v1.1
Temperature range (ambient temperature) ▶ Operation temperature	0 °C ... +85 °C
Dimensions (LxWxH, incl. BNC connector)	Approx. 115 mm x 110 mm x 35 mm
Weight	Approx. 230 g



4 Getting Started

In this chapter you find the following information:

4.1 Driver Installation	19
4.2 Device Configuration	19
4.3 PWM Measurement	19
4.3.1 Poll Mode	19
4.3.2 Push Mode	19



4.1 Driver Installation

The VH5110 is connected to CANoe by an Ethernet interface. For this reason an installation of a dedicated driver in CANoe is not necessary.

4.2 Device Configuration

The configuration and the firmware update of the VH5110 can be done with the Vector GreenPHY Configurator. This tool will be delivered with CANoe and can be opened via **CANoe|Vector Tool Launch** in the CANoe help.

The following configuration can be done with the Vector GreenPHY Configurator:

- ▶ Enable/disable PWM detection
- ▶ Set report mode (push or poll)
- ▶ Set thresholds and measurement period for push mode

4.3 PWM Measurement

Besides listening to the high-level communication protocols the VH5110 will also measure the PWM parameters to analyze the low-level communication specified in IEC61851-1. For this purpose, a direct connection of the VH5110 to the Control Pilot line is necessary.



Note

For measurement of the PWM parameters the VH5110 must be connected directly to the Control Pilot signal. With a connection via an inductive coupler around the charging cable the PWM parameter can not be measured.

The PWM parameters voltage, frequency and duty cycle are measured continuously by the VH5110. The measurement results you can get with two different methods.

4.3.1 Poll Mode

The measurement result will be polled on demand or cyclic via some CAPL code. The returned values are written into system variables which are provided with the **Monitor.dll** in the CANoe option SmartCharging. They are also displayed in the Trace Window.



Cross Reference

More information how to poll the PWM parameters can be found in the CANoe help.

4.3.2 Push Mode

The measurement result can actively be pushed by the VH5110 if a configured threshold of voltage, frequency or duty cycle is exceeded. The pushed values are written into System Variables which are provided with the **Monitor.dll** in the CANoe option SmartCharging. They are also displayed in the Trace Window.



Cross Reference

The thresholds for the push mode can be set with the Vector GreenPHY Configurator.



5 Index

A

Accessories	14
API	18

B

BNC Cable	15
BNC Connector	13

C

Certification	9
Connectors	11-12
Conventions	8

D

Device Configuration	19
Disclaimer	7
Driver Installation	19

H

Hazards	6
---------------	---

I

Inductive Coupler	14
Installation	10

M

MQS Connector	12
---------------------	----

P

Poll Mode	19
Product Overview	5
Push Mode	19
PWM Measurement	19

R

Requirements	5
--------------------	---

S

Scope of Delivery	5
Support	9

T

Technical Data	16-17
Trademarks	9

W

Warranty	9
----------------	---





More Information

- ▶ News
- ▶ Products
- ▶ Demo Software
- ▶ Support
- ▶ Training Classes
- ▶ Addresses

www.vector.com

