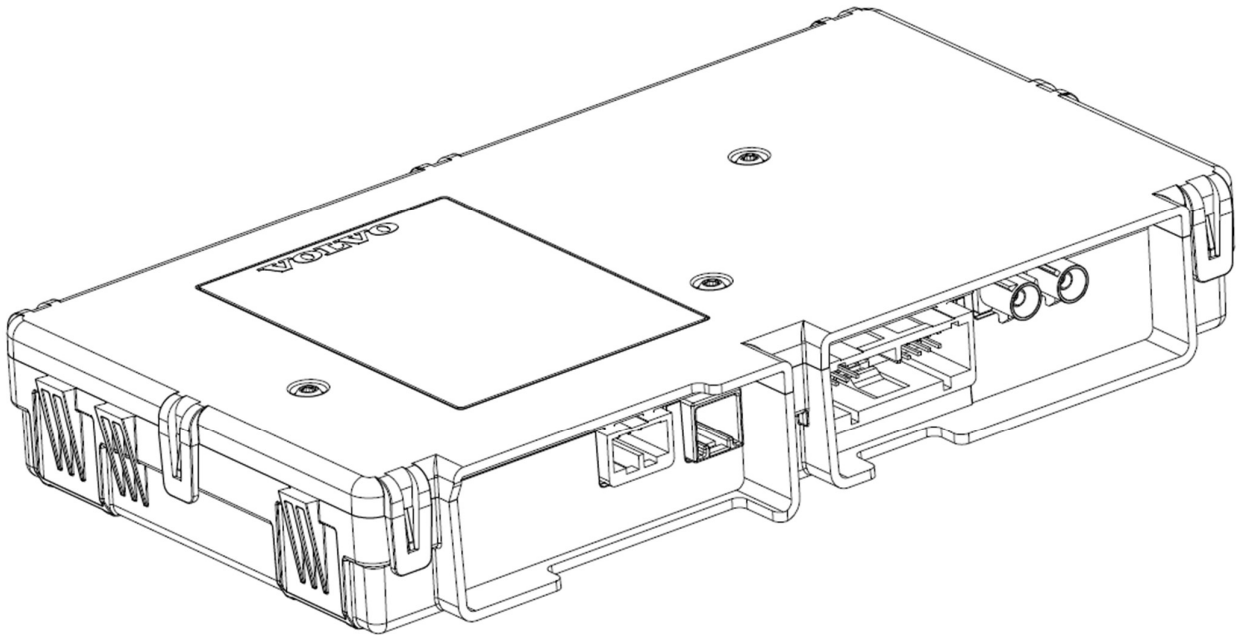


		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610 40037	Revision 1.4
	Title VCM User Manual		Page 1(9)

VCM User Manual



		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610_40037	Revision 1.4
	Title VCM User Manual		Page 2(9)

Content

1	General	3
1.1	Revision history.....	3
1.2	Abbreviations	3
1.3	References	3
2	Introduction	4
3	Technical Description.....	5
3.1	Connectors.....	5
3.1.1	DLC Ethernet connector.....	5
3.1.2	USB/IHU Ethernet connector.....	5
3.1.3	Main connector.....	5
3.1.4	WLAN antenna.....	5
3.1.5	GNSS antenna.....	5
3.2	Power supply	5
3.2.1	Supported bands	6
3.3	WLAN	6
3.3.1	Supported bands	6
4	Functional Description	7
4.1	Diagnostics	7
4.1.1	DoIP connection	7
4.1.2	CAN connection	7
4.1.3	WLAN	7
4.2	WLAN access point.....	7
4.3	Data gateway	7
4.4	Positioning information.....	7
5	Installation and maintenance	8
5.1	Installation	8
5.2	Maintenance	8
6	Regulatory Certifications.....	9
6.1	USA (FCC).....	9
6.1.1	OEM Requirements	9

		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610_40037	Revision 1.4
	Title VCM User Manual		Page 3(9)

1 General

1.1 Revision history

Revision	Author	Date	Description
1.0	Nicklas Andersson	2017-08-31	First version
1.1	Salah Alazawi	2017-10-09	Updated for FCC
1.2	Salah Alazawi	2019-09-12	Corrected FCC information
1.3	Nicklas Andersson	2020-07-03	Updated power values 5GHz WLAN
1.4	Nicklas Andersson	2020-09-08	Removed information for Canada variant. 5.1 Added information about antenna and cable length.

1.2 Abbreviations

Abbreviation	Meaning
DoIP	Diagnostics over IP
ECU	Electrical Control Unit
GNSS	Global Navigation Satellite System
OBD	On-Board Diagnostics
SRS	Supplemental Restraint System
WLAN	Wireless Local Area Network

1.3 References

Reference	Title	Doc. number	Revision

		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610_40037	Revision 1.4
	Title VCM User Manual		Page 4(9)

2 Introduction

The VCM is a connectivity ECU that is factory fitted in cars from Volvo Car Corporation (VCC).

It handles the diagnostic routing between the vehicle and the external test equipment for diagnostic connections via CAN*, Ethernet/WLAN and Remotely via available Internet connections.

The VCM can also be used as a Wi-Fi hotspot for people inside the vehicle as well as a W-Fi client to connect to available hotspots (for instance, a hotspot provided from a passenger's laptop or cell phone), and it provides raw GNSS position for use by other ECUs in the vehicle, such as the Navigation system.

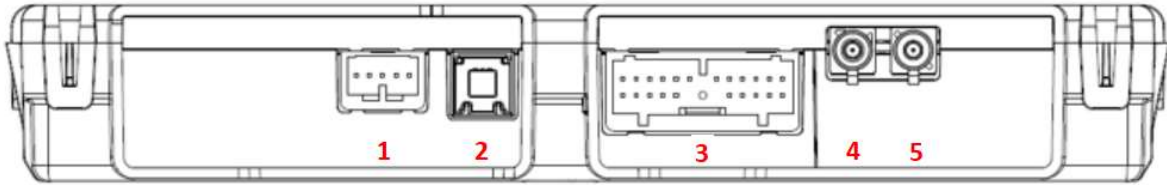
The VCM is capable of routing data to/from available Internet sources in the vehicle, for instance the Wi-Fi station in the VCM, a Bluetooth handy connected to another ECU in the vehicle, or a vehicle modem, also located in another ECU in the vehicle.

* Legislated OBD diagnostics (11-bit CAN) are not routed via the VCM.

		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610_40037	Revision 1.4
	Title VCM User Manual		Page 5(9)

3 Technical Description

3.1 Connectors



Connector No	Function
1	DLC Ethernet
2	USB/IHU Ethernet
3	Main Connector
4	WLAN antenna
5	GNSS antenna

3.1.1 DLC Ethernet connector

The DLC Ethernet connector is used for Ethernet communication with external diagnostics equipment.

3.1.2 USB/IHU Ethernet connector

The IHU Ethernet connector is used for Ethernet communication with the head unit in the car.

3.1.3 Main connector

The main connector is used to connect power, FlexRay and CAN communication, external SIM card holder, microphone and speaker, SOS, roadside assistance and exit buttons, and connection to the SRS control unit.

3.1.4 WLAN antenna

The pastel orange Fakra connector is used to connect an external WLAN antenna.

3.1.5 GNSS antenna

The blue Fakra is the input for the GNSS antenna.

3.2 Power supply

Operating voltage range: 8-16 VDC. Nominal 13.8V.
Maximum current consumption 1.5A @ 8V.

		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610_40037	Revision 1.4
	Title VCM User Manual		Page 6(9)

3.2.1 Supported bands

Technology	Bands
GPS	L1
GLONASS	L1 FDMA

3.3 WLAN

The WLAN antenna is connected to the orange Fakra connector.

The product supports dual-band 802.11b/g/n at 2.4GHz and 802.11a/n at 5GHz. Supported channels are listed below. When the product is installed in a vehicle the useable channels are limited to what is allowed in the current country.

3.3.1 Supported bands

3.3.1.1 802.11b

Parameter	
Channels	1-13
Data rates	1, 2, 5.5, 11 Mbps
Output power	+18 dBm

3.3.1.2 802.11g

Parameter	
Channels	1-13
Data rates	6, 9, 12, 18, 24, 36, 48, 54 Mbps
Output power	+15 dBm

3.3.1.3 802.11n

Parameter	
Channels	2.4GHz: 1-13 5GHz: 36-165
Data rates	MCS0-MCS7
Output power	2.4GHz: +15 dBm 5GHz: channels 36-140: +13dBm, channels 149-165 +11 dBm

3.3.1.4 802.11a

Parameter	
Channels	36-165
Data rates	6, 9, 12, 18, 24, 36, 48, 54 Mbps
Output power	5GHz: channels 36-140: +13dBm, channels 149-165: +11 dBm

		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610_40037	Revision 1.4
	Title VCM User Manual		Page 7(9)

4 Functional Description

4.1 Diagnostics

4.1.1 DoIP connection

The DoIP interface in the vehicle is located in the OBD connector.

When a test equipment is connected on the OBD Ethernet port, the VCM presents itself on the network using a “Vehicle Announcement Message”, as specified in ISO 13400-2. Based on the content of this message, an external tester tool can connect to the VCM and create a diagnostic session.

4.1.2 CAN connection

The diagnostics over CAN interface is also located in the OBD connector.

To communicate with the VCM and the ECUs behind the VCM in the vehicle topology, the diagnostic requests shall be sent with 29-bit addressing.

The same CAN interface is used for legislated OBD diagnostics. For such purposes, 11-bit addressing is used. Such CAN traffic does not affect the VCM.

4.1.3 WLAN

Diagnostics functionality is also available via WLAN. The unit can be set in a mode where it acts like a WLAN station and attaches to a hotspot in the workshop.

4.2 WLAN access point

VCM can act as a WLAN access point for passengers in the car.

User interface needs to be implemented in an external unit, e.g. in a head unit with display. The WLAN access point functionality is controlled via IHU Ethernet interface.

4.3 Data gateway

VCM acts as a data gateway for the WLAN access point and other ECUs in the vehicle. It can e.g. provide internet connectivity for the head unit.

The data gateway is controlled via the IHU Ethernet interface.

4.4 Positioning information

The product automatically outputs GNSS raw position data on the CAN bus.

The GNSS data is used by other ECUs in the vehicle, for instance the Navigation system.

		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610_40037	Revision 1.4
	Title VCM User Manual		Page 8(9)

5 Installation and maintenance

5.1 Installation

The VCM is factory fitted in Volvo vehicles. It is not possible to buy this product separately.

The product is certified to be used with an external roof mounted antenna.

Volvo part number 31346764

Minimum cable length is 2.5m.

5.2 Maintenance

The status of the VCM can be read via diagnostic connections using special workshop tools. In addition, other ECUs monitor the communication from the VCM and in case of missing/invalid communication, the Central Electronic Module in the vehicle is alerted, and will display a warning to the driver.

Maintenance and replacement of the VCM can only be performed by Volvo certified workshops.

		Owner Nicklas Andersson	Date 2020-09-08
	Classification	Document number 5610_40037	Revision 1.4
	Title VCM User Manual		Page 9(9)

6 Regulatory Certifications

6.1 USA (FCC)

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

6.1.1 OEM Requirements

Following text should be printed in the user manual for vehicles in US:

Type Approval USA
FCC ID: 2AGKKVCM

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.