Version

2.0

Hardware Manual

VCMM

Vehicle Communication & Measurement Module

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VCMM Hardware Manual

Manufactured by Bosch Automotive Service Solutions GmbH, Porschestrasse 4, 63512 Hainburg, Germany

Trademark Acknowledgements

Copyright Information

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Definitions, Acronyms, and Abbreviations

- CAN — Controller Area Network
- CE — European CE marking (European Conformity)
- CFR — Customer Flight Recorder – vehicle data link recording device
- CSA — Canadian Standards Association
- DLC — Data Link Connector - vehicle diagnostic connector, SAE J1962 (OBDII vehicles)
- ECU — Electronic Control Unit
- FTCAN — Fault Tolerant CAN
- Host — PC controlling VCMM and executing Ford's software or VCI Manager software
- HS CAN — High Speed CAN (500 kbps)
- HW — Hardware
- IDS — Integrated Diagnostic System
- IEEE — Institute of Electrical and Electronics Engineers
- ISO — International Standards Organization
- ISO-9141 — Serial communication protocol implemented in Ford and CARB versions
- LED — Light Emitting Diode
- MS CAN — Medium Speed CAN (125 kbps)
- PC — Personal Computer
- Pendant — CFR user interface cable (VCMM optional item)
- RoHS — Registry of Hazardous Substances
- SAE — Society Of Automotive Engineers
- SCP — Standard Corporate Protocol (Ford Motor Company proprietary)
- SW — Software
- UART — Universal Asynchronous Receiver Transmitter
- UBP — UART Based Protocol (Ford Motor Company proprietary)
- USB — Universal Serial Bus
- VCM3 — Vehicle Communication Module 3 (Next-Generation)
- VCMM — Vehicle Communication & Measurement Module
- VMM — Vehicle Measurement Module

VCMM Description

The VCMM is Ford's next-generation high performance, ruggedized, vehicle serial communications and measurement instrumentation gateway. This enhanced device combines the functionality of a VCM3, a Vehicle Measurement Module and a Vibration Analyzer into one unit. It provides multiple vehicle serial communication interfaces, including other functionality, to meet the requirements for all Ford Motor Company vehicles.

The VCMM has a 4 channel oscilloscope and a DVOM function. There is also a 5th scope channel routed directly to the DLC pins.

The VCMM also provides a signal generator function that can simulate vehicle sensors or other signals on the vehicle.

The VCMM unit is housed in a shock resistant polycarbonate case with rubber end boots for increased durability and ruggedness in service bay and road test environments. It features extended operating temperature and voltage range beyond those in products intended for laboratory use.

The VCMM unit contains six LED indicators and a signaling device to provide the user with continuous visual as well as audible operating status indication.

The VCMM has wireless capability (*if equipped with USB 2.0 wireless adapter*), but still provides detachable cables for direct connection to industry standard high-speed USB host interfaces (e.g., Laptops, PC's, Mini Laptops, etc.) as well as to the vehicle under test.

The VCMM also supports Customer Flight Recorder (CFR) functionality when the *optional Pendant Cable VP-2* is attached. The CFR is an application that is designed to be installed and run on the VCMM. The VCMM CFR tool is intended to be used for capturing and storing vehicle communications network data, without needing to have a continuous connection to Ford Diagnostic Software.

Chapter

1

Safety

Read and understand this safety information before installing, assembling, and using this equipment.

DO observe the safety warnings and notices in this document.

WARNING: This indicates the presence of a hazard that can cause serious personal injury if the hazard is not avoided.

NOTICE: This indicates the presence of a hazard that can cause damage to the VCMM, a vehicle, other equipment connected to the VCMM, or might corrupt software if the hazard is not avoided.

Proper Installation and Use of this Equipment

This equipment has been designed, manufactured and tested to meet the requirements of International Standards; however, like any apparatus, care must be taken in its installation and use.

NOTICE: This equipment must only be used by properly trained personnel.

NOTICE: DO NOT allow any cables of this equipment to be positioned where they can be trapped, snagged, stretched across sharp edges, or create any potential hazard.

WARNING: If the VCMM is being used in a moving vehicle, ensure that the VCMM and cables do not distract or interfere with the driver, or form a hazard in any way.

WARNING: DO NOT allow any cables to become entangled with operator or driving controls. This can cause interference with driving and can cause injury.

DO use this equipment in accordance with the operating procedures.

Before carrying out maintenance and cleaning of the VCMM**,** make sure the unit is **NOT** connected to a power source, vehicle, or PC. Use only a well-diluted, mild, non-abrasive cleaning agent applied using a soft, lint free cloth.

DO NOT use or apply undiluted cleaning agent directly to the equipment surface and **NO NOT** soak the cloth. Take care that cleaning fluid does not enter connector receptacles. **DO NOT** expose this equipment to spilled liquids.

DO NOT continue to use this equipment if you have **ANY** doubts that it may not be working properly or if it is damaged in anyway. Contact your regional technical support for assistance.

DO NOT remove any fixed covers unless you are authorized/qualified to do so.

A defective electrical earth (ground) connection to any equipment may cause an electric shock hazard. This hazard may pass through the signal cabling and to any other equipment interconnected. It is recommended that you check electrical wiring at frequent intervals and whenever alterations are made.

DO keep the VCMM away from devices that generate radio interference.

NOTICE: Do ensure the VCMM is not subjected to extreme temperature or prolonged exposure to direct sunlight that may cause heating of the VCMM.

NOTICE: If any liquid is spilled on this equipment remove the power immediately and ensure that it is dried out completely before restoring power.

WARNING: If equipment is used in a manner not specified by the manual, the protection provided by the equipment may be impaired.

Equipment Precautions

The following warnings must be observed when using the VCMM.

IMPORTANT SAFETY INSTRUCTIONS

WARNING: Failure to follow these instructions will increase the risk of personal injury.

Step 1: Read all instructions.

Step 2: **DO NOT** use the VCMM or its cables and probes for measurements greater than 60 VDC, 30 VAC or 42 VAC peak. The accessories must only be used in circuits which are not connected to a mains voltage supply (measuring category 0 according to EN 61010-2-030:2010). The enclosed accessories must only be used with the VCMM, and at voltages below the voltage value as imprinted on the accessories. When combining accessories, it must be ensured that the lowest voltage value imprinted on the accessories is not exceeded.

Step 3: **DO NOT** remove the rubber end boots while using the VCMM unit. The rubber end boots serve as shock protection and include important VCMM port information symbols.

Step 4: Care must be taken as burns can occur from touching hot parts or surfaces.

Step 5: **DO NOT** operate equipment if damage to unit or cable is suspected.

Step 6: **DO NOT** let cables hang over edge of table, bench or counter or come in contact with hot manifolds or moving fan blades.

Step 7: **DO NOT** place tools or test equipment on vehicle fenders or other places inside the engine compartment.

Step 8: Let equipment cool completely before putting away. Loop cables loosely around equipment when storing.

Step 9: Adequate ventilation should be provided when working on internal combustion engines.

Step 10: Keep hair, loose clothing, jewelry, fingers and all parts of body away from moving parts of the vehicle.

Step 11: Use this equipment only as described in the manual. Use only manufacturer's recommended attachments.

Step 12: **ALWAYS WEAR SAFETY GLASSES WHEN USING GARAGE EQUIPMENT.** Everyday eyeglasses only have impact resistant lenses, they are **NOT** safety glasses.

SAVE THESE INSTRUCTIONS

Chapter

2

VCMM Features & Functions

The VCMM is used by technicians as a tool in diagnosing and repairing automotive electrical and electronic systems. The VCMM is designed to connect the vehicle to a PC application which then functions through the VCMM for data transfer, vehicle measurements, signal generation, vibration analysis and ECU reprogramming. Refer to Figure 1 and 2 below for the VCMM hardware features and functions.

Figure 1

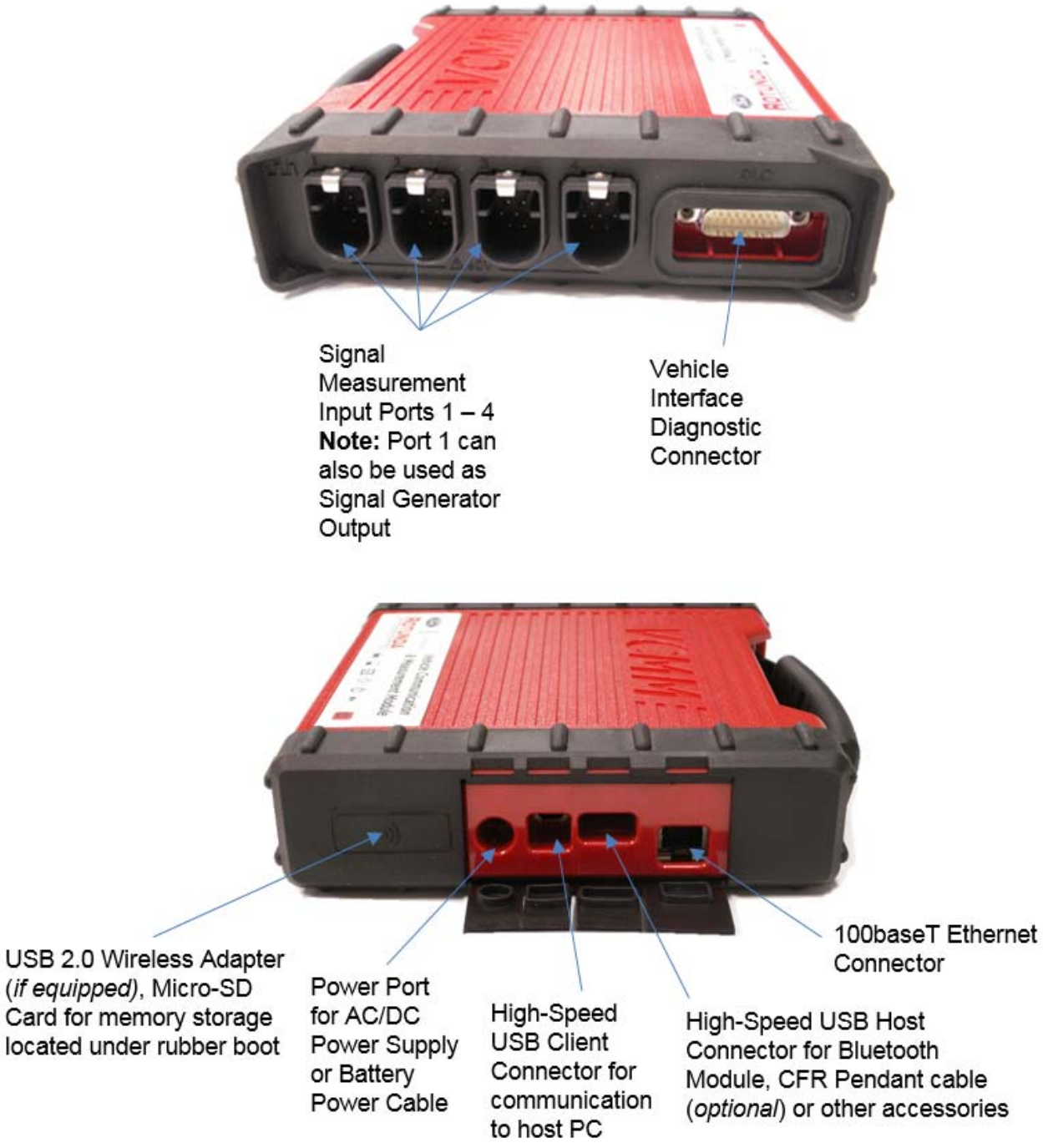

Signal Measurement Input Ports 1 – 4 **Note:** Port 1 can also be used as Signal Generator Output
Vehicle Interface Diagnostic Connector
USB 2.0 Wireless Adapter (*if equipped*), Micro-SD Card for memory storage located under rubber boot
Power Port for AC/DC Power Supply or Battery Power Cable
High-Speed USB Client Connector for communication to host PC
High-Speed USB Host Connector for Bluetooth Module, CFR Pendant cable (*optional*) or other accessories
100baseT Ethernet Connector

Figure 2

Normal Power-up Of VCMM and Connection to PC

Connect the VCMM to power using one of the three methods shown below:

1. Use the DLC cable provided in the VCMM kit – Connect the 26-pin end to the VCMM Vehicle Interface Diagnostic Connector (see Fig. 2 and 3) and the 16-pin J1962 end to the vehicle.
2. Use the Battery Power Cable provided in the VCMM kit – Insert the DC power plug into the VCMM Power Port (see Fig. 2 and 3) and attach the battery clips to the vehicle battery.
3. Use the AC/DC Power Supply and AC cable provided in the VCMM kit – Connect the AC/DC Power Supply to the AC power cable. Use only a certified power cord having at least 18AWG/3G (3 x 0.75mm^2) cable with power plug and connector rated 250V, 10A. This is provided with the external power supply having input voltage range of 100-240Vac, 47-63Hz, rated 0.5A. Connect the power cable to a 110V or 220V AC power source outlet that is equipped with a reliable protective earth (ground) connection. Insert the DC power plug into the VCMM Power Port (see Fig. 2 and 3).

USB Power only to the VCMM is insufficient for normal operation.

Connect the VCMM to the PC using the USB cable provided in the VCMM kit. Connect the type B end of the USB cable to the VCMM High-Speed USB client connector (see Fig. 2 and 3). Connect the type A end of the USB cable to the PC USB port.

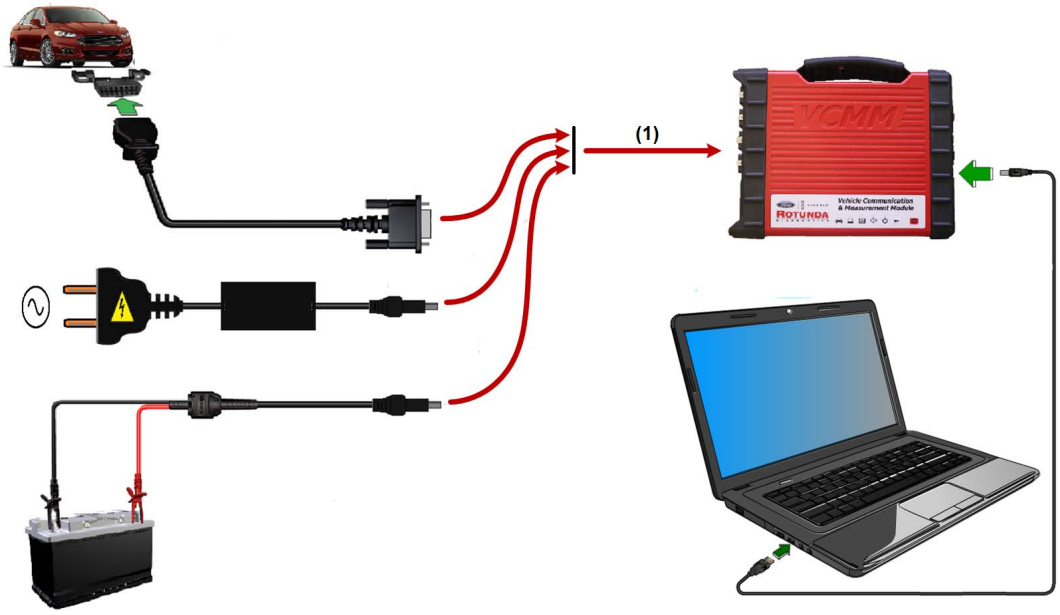


Figure 3

For all the power sources described above, when power is first applied to the VCMM, the "Vehicle Interface LED" will illuminate. After 5 seconds the "PC Interface LED" will illuminate and the "Vehicle Interface LED" will turn off and around 10 seconds the "Power LED" will illuminate and the "PC Interface LED" will turn off. After 15 seconds the speaker will beep for 1 second. Refer to Troubleshooting chapter 4 for examples of abnormal LED operation.

Software Updates

Periodically, the user will be prompted to update the VCMM software using a PC when new software releases become available.

How To Factory Reset Your VCMM

A factory reset may fix your VCMM if it becomes inoperable (e.g., VCMM will not boot-up properly, VCMM LED's not functioning properly, etc.).

Instructions:

1. Shut down the Ford Software application if it is running.
2. Make sure the VCMM is connected to a PC using the USB cable and external power (see Figure 3).
3. Launch the VCI Manager application on the PC.
4. Press and hold the Recovery Mode button for 3 seconds until the red Error LED turns on (see Figure 1).
5. The VCI Manager will display an icon of a VCMM in the Recover state (see Figure 4).
6. Click on the VCMM icon to select it (see Figure 5).
7. Follow the VCI Manager on-screen instructions to complete the software installation.

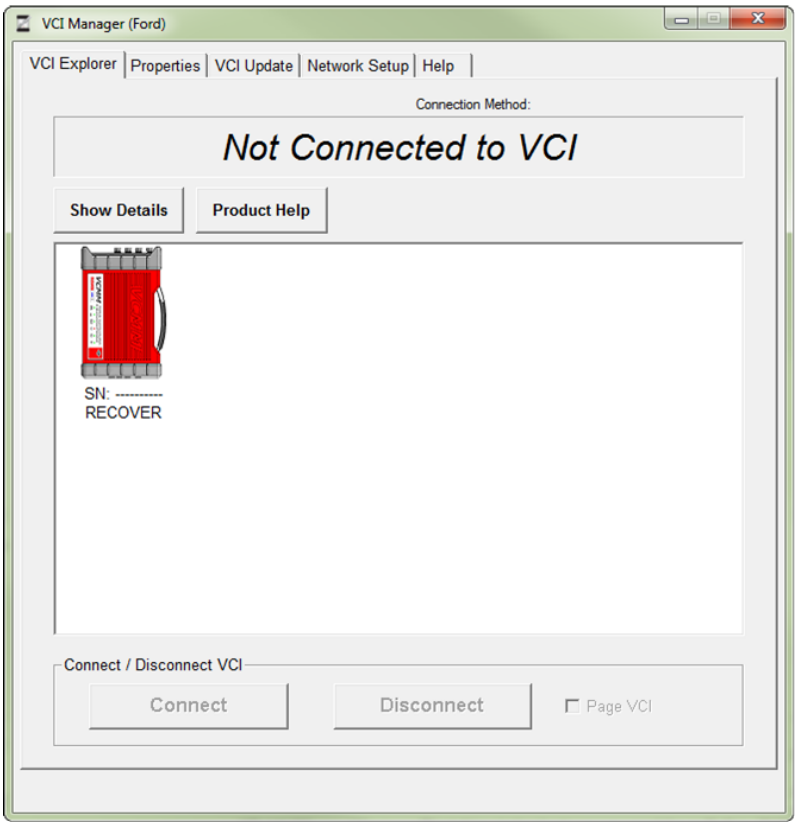


Figure 4

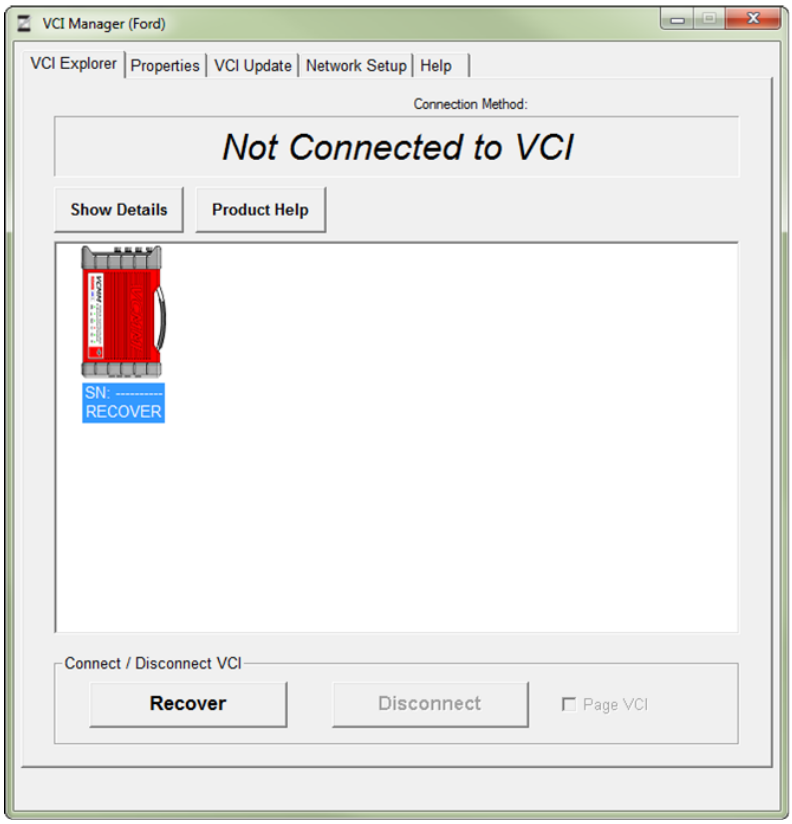

VCI Manager (Ford)
VCI Explorer
Properties
VCI Update
Network Setup
Help
Connection Method:
Not Connected to VCI
Show Details
Product Help
SN: ----------
RECOVER
Connect / Disconnect VCI
Recover
Disconnect
Page VCI

Figure 5

Chapter 3

VCMM Kit Contents and Accessories

50A Current Probe

Rotunda Item Number: 164-R9831
Bosch Part Number: 1699200711G7P

Included in standard and advanced kits

Description: The 50A Current Probe is used to measure automotive electrical currents up to ±50A DC or AC peak in magnitude.

500A Current Probe

Rotunda Item Number: 164-R9832
Bosch Part Number: 1699200712G7P

Included in standard and advanced kits

Description: The 500A Current Probe is used to measure automotive electrical currents up to ±500A DC or AC peak in magnitude.

Pressure / Vacuum Transducer

Rotunda Item Number: 164-R9833
Bosch Part Number: 1699200713B5X

Legacy item, not currently being shipped with any kits

Description: The Pressure / Vacuum Transducer is used with the Fuel Hose Assembly and the Transmission Extension Hose to measure automotive pressures and vacuums such as low pressure fuel rail or transmission fluid pressure. Range is -15 PSI to + 500 PSI.

Fuel Hose Assembly

Rotunda Item Number: 164-R9533
Bosch Part Number: 1699200705B7Y

Legacy item, not currently being shipped with any kits

Description: The Fuel Hose Assembly lets you connect the Pressure / Vacuum Transducer to fuel rails to measure fuel system pressure.

Transmission Extension Hose

Rotunda Item Number: 164-R9534
Bosch Part Number: 1699200706B7Y

Legacy item, not currently being shipped with any kits

Description: The Transmission Extension Hose lets you connect the Pressure / Vacuum Transducer to transmission systems to measure transmission fluid pressure.

WiFi USB Adapter

Rotunda Item Number: 257-1699200155
Bosch Part Number: 1699200702B8Y

Included in all kits (2 ea.)

Description: The VCMM kit includes two (2) WiFi USB Adapters to enable wireless communications with a host PC. One adapter is installed in the VCMM at the factory, the other is for installation by the user in the host PC.

DLC Cable

Rotunda Item Number: 164-R9837
Bosch Part Number: 1699200717B8Y

Included in all kits

Description: The DLC Cable is used to connect the VCMM to the vehicle's Diagnostic Link Connector to power the VCMM and to enable communication between the VCMM and the vehicle ECUs.

USB Cable

Rotunda Item Number: 257-1699200385
Bosch Part Number: 1699200703B8Y

Included in all kits

Description: The USB Cable is used to connect the VCMM to a host PC to enable USB communication.

Storage Case

Rotunda Item Number: 164-R9839
Bosch Part Number: 1699200719B8Y

Included in standard and advanced kits

Description: The VCMM Storage Case provides an organized method of storing the VCMM and its accessories, enabling easy access.

AC/DC Power Supply

Rotunda Item Number: 164-R9843
Bosch Part Number: 1699200573B8Y

Included in standard and advanced kits

Description: The AC/DC Power Supply lets you power the VCMM from a wall socket. The input voltage rating is 100-240 VAC, 47-63Hz, 0.5A max. and the output is 16 VDC, 1.25A max. The VCMM kit includes the wall socket power cable that is correct for your region.

Battery Power Cable

Rotunda Item Number: 164-R9838
Bosch Part Number: 1699200718B6X

Included in all kits

Description: The Battery Power Cable lets you power the VCMM from the vehicle battery. It includes internal 3A resettable fuses. Note: these fuses are not user accessible.

Do not connect the Battery Power Cable to voltages greater than 30VDC.

USB Thumb Drive with Quick Start Guides

Bosch Part Number: 1699200465

Included in all kits

Description: The VCMM kit includes a USB Thumb Drive that contains the VCMM Quick Start Guide in all supported languages, along with copies of VCMM certification documents.

Red Test Lead

Bosch Part Number: 1699200293

Included in all kits

Description: The Red Test Lead enables you to connect the VCMM to automotive circuits for measuring voltage and resistance and for injecting signals using the VCMM Signal Generator function.

Blue Test Lead

Bosch Part Number: 1699200294

Included in standard and advanced kits

Description: The Blue Test Lead enables you to connect the VCMM to automotive circuits for measuring voltage and resistance and for injecting signals using the VCMM Signal Generator function.

Yellow Test Lead

Bosch Part Number: 1699200295

Included in standard and advanced kits

Description: The Yellow Test Lead enables you to connect the VCMM to automotive circuits for measuring voltage and resistance and for injecting signals using the VCMM Signal Generator function.

Green Test Lead

Bosch Part Number: 1699200296

Included in standard and advanced kits

Description: The Green Test Lead enables you to connect the VCMM to automotive circuits for measuring voltage and resistance and for injecting signals using the VCMM Signal Generator function.

Red Probe with Tick Button

Bosch Part Number: 1699200270

Included in standard and advanced kits

Description: The Red Probe with Tick enables you to connect the VCMM to automotive circuits for measuring voltage and resistance and for injecting signals using the VCMM Signal Generator function. It includes an LED that can be turned on to provide illumination, and a tick button to press to tell the VCMM to take a measurement.

Kit of Probe and Alligator Clips

Rotunda Item Number: 164-R9845
Bosch Part Number: 1699200724B8Y

Included in standard and advanced kits

Description: The kit of probe and alligator clips allows you to connect the VCMM Test Leads and Red Probe with Tick to automotive circuits to measure voltage and resistance. Kit contains 5 probes and 5 small alligator clips or red, blue, yellow, green, black. Also, 2 large black alligator clips and 3 more small black alligator clips.

Universal Probe Tip Adapters (4 ea.)

Rotunda Item Number: 164-R9834
Bosch Part Number: 1699200714B8Y

Included in standard and advanced kits

Description: The VCMM kit includes a set of 4 Universal Probe Tip Adapters that connect to the VCMM Test Leads or Red Probe with Tick and enable you to back probe automotive connectors.

Probe Tip Adapters (19 ea.)

Rotunda Item Number: 164-R9835
Bosch Part Number: 1699200715B8Y

Included in standard and advanced kits

Description: The VCMM kit includes a set of 19 Probe Tip Adapters that enable you to connect the VCMM Test Leads or Red Probe with Tick directly to automotive connector pins. Nine sets of male/female contacts with matching colors and one female contact marked (BM, BF, CM, CF, DM, DF, EM, EF, GM, GF, HM, HF, IM, IF, JF, KM, KF, LM, LF).

Temperature Probe

Rotunda Item Number: 164-R9836
Bosch Part Number: 1699200716B6X

Included in standard and advanced kits

Description: The Temperature Probe enables the VCMM to measure temperatures from -20º to 150ºC ±1ºC. When using the temperature probe exercise caution to prevent contact between hot surfaces and the probe cable.

Vibration Analyzer Accelerometer “A”

Rotunda Item Number: 164-R9827
Bosch Part Number: 1699200707B5X

Included in standard and advanced kits

Description: The Vibration Analyzer Accelerometer “A” allows the VCMM to measure vibration frequencies up to 500 Hz with a ±4 G amplitude as part of the Vibration Analyzer function.

Timing Light Inductive Loop

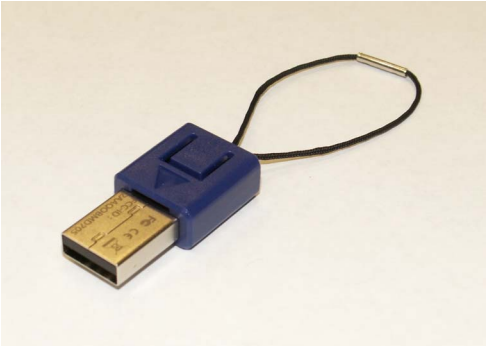
Rotunda Item Number: 164-R9829
Bosch Part Number: 1699200283

Included in standard and advanced kits

Description: The Timing Light Inductive Loop lets you drive a timing light for improved component identification used during vibration analysis. Note: timing light is not included in the kit.

Bluetooth Module with Extender

Rotunda Item Number: 164-R9840
Bosch Part Number: 1699200720B8Y



Legacy item, not currently being shipped with any kits

Description: The Bluetooth Module with Extender operates with the VCMM Bluetooth Analyzer software to let you test Bluetooth-enable automotive infotainment systems. It includes a plastic extender and lanyard to facilitate inserting and removing into the VCMM.

Advanced Options Kit

Rotunda Item Number: 164-R9825
Bosch Part Number: 1699200347B7Y

Optional kit

Description: The Advanced Options Kit greatly extends the diagnostic capabilities of the VCMM. It includes:

- Secondary Ignition Transducer Cables, Coil-On-Plug pickups and Capacitive Plug Wire Clips enable the VCMM to display secondary ignition signals.
- Driveline Balance Kit – used with the VCMM to perform dual plane driveline balance using a photo tachometer to measure driveshaft revolution frequencies. Also, includes magnetic mount, phototach bracket, retro-reflective tape, and scale.
- Accelerometer “B” – a second Vibration Analyzer Accelerometer to better isolate the source of vehicle vibrations.

VCMM / VMM Adapter Cable

Rotunda Item Number: 164-R9841
Bosch Part Number: 1699200721B6X

Optional item

Description: The VCMM / VMM Adapter Cable lets you connect the VCMM to any of 3 accessories provided with the previous generation VMM:

- VMM 50A Current Probe
- VMM 500A Current Probe
- VMM Pressure / Vacuum Transducer

BNC Adapter Cable

Rotunda Item Number: 164-R9842
Bosch Part Number: 1699200722B6X

Optional item

Description: The BNC Adapter Cable lets you connect the VCMM to standard BNC cables and probes.

Measurement Cables and Probes Technical Specifications

Part Number	Type	Description	Ratings
1699200711G7P 164-R9831	Std	50A Current Probe	± 50A DC or 35A RMS AC -10º to 55ºC
1699200712G7P 164-R9832	Std	500A Current Probe	± 500A DC or 350A RMS AC -10º to 55ºC
1699200713B5X 164-R9833	Leg	Pressure Vacuum Probe	-15 PSI to +500 PSI -40º to 105ºC
1699200293	Std	Red Test Lead	60VDC / 1A -40º to 105ºC
1699200294	Std	Blue Test Lead	60VDC / 1A -40º to 105ºC
1699200295	Std	Yellow Test Lead	60VDC / 1A -40º to 105ºC
1699200296	Std	Green Test Lead	60VDC / 1A -40º to 105C
1699200270	Std	Red Probe with Tick Button	60VDC / 1A -40º to 105ºC
1699200716B6X 164-R9836	Std	Temperature Probe	-20º to 150ºC ±1ºC Cable -40º to 105ºC
1699200707B5X 164-R9827	Std	Accelerometer A	1 to 500 Hz ±4G -20º to 70ºC
1699200708B5X 164-R9828	Adv	Accelerometer B	1 to 500 Hz ±4G -20º to 70ºC
1699200292 164-R9829	Std	Timing Light Inductive Loop	Drives Timing Light -40º to 105ºC
1699200404 1699200287 02002984-012 257-02002984012	Adv Adv Adv	Phototach Sensor Phototach Cable Retro-reflective Tape 12 in.	Response time 45us -40º to 70ºC Cable -20º to 105ºC
1699200710B6X 164-R9830 1699200297 1699200298 1699200299 1699200300	Adv	Kit, Secondary Ignition Cables (set of 4) Red Secondary Ignition Blue Secondary Ignition Yellow Secondary Ignition Green Secondary Ignition	For Use with Capacitive Probes RCA Plug -40º to 105ºC
1699200721B6X 164-R9841	Opt	VMM Adapter Cable	60VDC / 1A -40º to 105ºC
1699200722B6X 164-R9842	Opt	BNC Adapter Cable	60VDC / 1A -40º to 105ºC

Type Std = in standard kit
Type Adv = in advanced kit
Type Opt = optional item
Type Leg = legacy item

Measurement Accessories Technical Specifications

Part Number	Type	Description	Ratings
1699200714B8Y 164-R9834	Std	Kit, Universal Probe Tips (set of 4 “A”)	60 VDC 1A -40º to 105ºC
1699200715B8Y 164-R9835	Std	Kit, 19 Probe Tip Adapters BF,CF,DF,EF,GF,HF,IF,JF,KF,LF BM,CM,DM,EM,GM,HM,IM,KM,LM	60VDC / 1A -40º to 105ºC
1699200724B8Y 164-R9845	Std	Kit, Probe, Alligator Clips 1 x Red Probe 1 x Blue Probe 1 x Yellow Probe 1 x Green Probe 1 x Black Probe 1 x Red Small Alligator Clip 4 x Black Small Alligator Clip 1 x Yellow Small Alligator Clip 1 x Green Small Alligator Clip 1 x Blue Small Alligator Clip 2 x Black Large Alligator Clip	-40º to 105ºC CAT II 1000V / 32A CAT II 1000V / 32A CAT II 1000V / 32A CAT II 1000V / 32A CAT II 1000V / 32A CAT II 300V / 15A CAT II 300V / 15A CAT II 300V / 15A CAT II 300V / 15A CAT II 300V / 15A CAT II 1000V / 32A
1699200704B8Y 164-R9529 4 x 1699200279	Adv	Kit, Coil-On-Plug (set of 4) Clip, COP	RCA Jack Capacitive Coupling to Coil-On-Plug -40º to 105ºC
1699200284BX4 164-R9528	Adv	Kit, Secondary Ignition Clip (set of 4) Secondary Ignition Clip	RCA Jack Capacitive Coupling to Spark Plug Wire -40º to 105ºC

Note: all probes and alligator clips should be limited to 60VDC / 1A max when used with VCMM.

Accessories Technical Specifications

Part Number	Type	Description	Ratings
1699200717B8Y 164-R9837	Std	DLC Cable	60V / 3A -20º to 80ºC
1699200703B8Y 257-699200385	Std	USB Cable	USB 2.0 -20º to 80ºC
1699200718B6X 164-R9838	Std	Battery Power Cable	30V / 3A -40º to 105ºC
1699200702B8Y 257-699200155	Std	WIFI USB Adapter x 2	802.11n 0º to 50ºC
1699200720B8Y	Std	Bluetooth USB Adapter with Extender	Bluetooth 4.0 USB Adapter – Class 1 -10º to 50ºC
1699200465	Std	USB Drive with Quick Start Guides	128 Mbyte 0º to 40ºC
1699200573B8Y 164-R9843	Std	AC/DC Power Supply	Input 100-240Vac, 47-63Hz, 0.5A Output 16VDC 1.25A 0-40ºC
1699200723BX4 164-R9844	Std	AC Power Cord Type B North America	Connectors 250V, 10A Cable 18 AWG/3G (3x 0.75mm²)
1699200577 - 1699200583	Std	AC Power Cord – Country Specific	Connectors 250V, 10A Cable 18 AWG/3G (3x 0.75mm²)

Chapter 4

Troubleshooting

Users should perform the following basic checks to determine if they can resolve any problems with the VCMM unit. If the VCMM is still inoperable after performing the checks, contact your regional technical support for assistance. Do not attempt to service or repair the VCMM hardware yourself – service or repair by any party other than Bosch or an authorized Bosch Service Center invalidates the warranty.

Troubleshooting Table

Problem Symptoms	**Checks & Possible Causes**
VCMM will not power on (No LED's turn on)	• Make sure that secure cable connections are made between the VCMM and vehicle DLC cable or battery power cable or AC/DC power supply • Make sure that the cables do not have any bent, broken, missing, or dirty/corroded cable connector pins • Make sure that the VCMM unit does not have any bent, broken, missing, or dirty/corroded connector pins • Verify battery voltage at the vehicle DLC or battery power cable powering the VCMM is sufficient (12V nominal) • If after power is applied for 5 seconds and the VCMM power on boot-up fails, attempt to recover the software (refer to ***How To Factory Reset Your VCMM*** section) on the VCMM and retry power on boot-up • If VCMM fails to power on after making all the checks above, contact your regional technical support
VCMM powers on, but operates abnormally	• Cycle (remove/reconnect) power to the VCMM • Make sure that the VCMM performs the power on boot-up successfully. Refer to the ***Normal Power-up of VCMM*** section • If the VCMM power on boot-up fails, attempt to recover the software (refer to ***How To Factory Reset Your VCMM*** section) on the VCMM and retry power On boot-up • If the VCMM power on boot-up problem persists, contact your regional technical support

VCMM Power LED is on, a 1 second beep should sound after 10 seconds, if the beep is not heard	• Remove external power and the USB cable and reconnect both cables • If VCMM error persists after making the check above, contact your regional technical support
VCMM Error LED is red immediately after it is booted	• The VCMM is in recover mode • Attempt to recover the software (refer to ***How To Factory Reset Your VCMM*** section) on the VCMM • If recovery fails, attempt to recover on a different PC (may be a PC related issue) • If VCMM error persists after making the check above, contact your regional technical support
VCMM Vehicle Interface LED stays on constantly	• Possible VCMM firmware update issue. Attempt to recover the software (refer to ***How To Factory Reset Your VCMM*** section) on the VCMM • If VCMM error persists after making the check above, contact your regional technical support
VCMM PC Interface LED stays on constantly	• Remove external power and the USB cable and reconnect both cables • If VCMM error persists after making the check above, contact your regional technical support
VCMM turns off (shuts-down/suspends-operation, all LEDs off) immediately after being powered on	• Verify the ambient temperature is within the acceptable operating range for the VCMM device: -20°C to 63°C (-4°F to 145°F) • If the ambient temperature is outside this range allow the temperature to return to the acceptable operating range and the VCMM will automatically resume operation • If VCMM error persists when the ambient temperature returns to its operating range, contact your regional technical support
VCMM Stop/Play LED blinks and the speaker beeps at a constant rate	• External power has been removed after a diagnostic session has been started by the Ford Diagnostic Software • Reconnect external power

VCMM does not appear in the list of detected wireless devices in the Ford Diagnostic Software or VCI Manager Software and its Power LED blinks at a periodic rate	• Verify the VCMM is connected properly to power, the VCMM must be powered using the DLC cable or the battery power cable or the AC/DC power supply for the wireless interface to be operational • Verify the ambient temperature is within the acceptable operating range for the VCMM wireless interface: 0°C to 50°C (32°F to 122°F) • If the ambient temperature is outside this range allow the temperature to return to the acceptable operating range and the VCMM wireless interface will automatically be enabled and the Power LED will stop blinking and stay illuminated • If VCMM wireless interface problem persists when the ambient temperature returns to its operating range, contact your regional technical support
VCMM Power LED blinks continuously after being powered using the DLC cable	• Verify the ambient temperature is within the acceptable operating range for the VCMM wireless interface: 0°C to 50°C (32°F to 122°F) • If the ambient temperature is outside this range allow the temperature to return to the acceptable operating range and the VCMM wireless interface will automatically be enabled and the Power LED will stop blinking and stay illuminated • If VCMM wireless interface problem persists when the ambient temperature returns to its operating range, contact your regional technical support

Chapter 5

VCMM Technical Specifications

Voltage and Power Requirements	7 – 32 VDC, 20 Watts max Note: protected against reverse battery polarity	
Power Sources	- 12 & 24 volts vehicle power (using DLC cable or Battery Power Cable) - External AC/DC 16 volts power supply. Use only Bosch 1699200573 power adapter supplied with the kit (Sinpro Electronic model number EPU20A-107) Input 100-240 VAC, 47-63Hz, 0.5A. Output 16 VDC, 1.25A. - USB power (5 volts from a PC USB port)(Note: USB power is not adequate for normal operation)	
Vehicle Protocols	- CAN (High & Medium Speed) - FT CAN - SCP (SAE J1850 PWM)	- SAE J1850 VPW - ISO-9141 (K & L lines) - UBP
Host/Client/Wireless Interfaces	- High Speed USB 2.0 Client (480 Mbps) - High Speed USB 2.0 Host (480 Mbps) - High Speed USB 2.0 Host (480 Mbps) for wireless adapter use - Wireless USB 2.0 adapter (IEEE 802.11 b/g/n), ***if equipped*** - 100baseT Ethernet	
Measurement Interfaces	- 4 Channels of High-Speed (8 Msps) external inputs – independently galvanically isolated - 1 Channel of High-Speed (16 Msps) internal input (from DLC) - 1 Signal Generator output (0-30VDC at 100 mA drive - common ground with DLC) - The 4 Channel Measurement Interfaces are self-calibrating and periodic user calibration is not required	
User Interface	6 LEDs (Vehicle, PC, Measurement, Error, Power & Play/Stop), audible signaling device, User Input button, Recover button	
Host PC USB Cable	Detachable 3.05 m (10 ft) with molded USB 2.0 connector	
Vehicle DLC Cable	Detachable 1.83 m (6 ft) with molded DLC connector	
CFR Pendant Cable (*optional*)	Detachable 1.83 m (6 ft) with 2 LEDs, 7-segment display, audible beeper, pushbutton and molded USB type A connector	
Case	Shock resistant polycarbonate case with rubber protective end boots, 1m free-fall drop impact resistant on all surfaces	
Dimensions/Weight	Size: H: 5.0 cm (2.0 in) W: 17.9 cm (7.1 in) L:21.3 cm (8.4 in) Weight: 0.80 kg (1.75 lb.) without cables	
Environmental: Temperature & Humidity	Operating: VCMM unit: -20ºC to 63ºC (-4ºF to 145ºF) Wireless USB 2.0 adapter: 0ºC to 50ºC (32ºF to 122ºF) at 10% to 90% RH non-condensing Storage: -40ºC to 85ºC (-40ºF to 185ºF) at 10% to 90% RH non-Condensing	

Maximum Operating Altitude	2000 meters when using Bosch 1699200573 external power supply provided with the VCMM kit
Standards & Regulatory Compliances	- CE marking for EMC compliance EN 61326-1:2013 Class A - Safety compliance to IEC 61010-1:2010, IEC 61010-2-030 and CB - Ingress Protection to IEC 60529 for dust (level 5) and water (level 4), tested in non-operating mode with rubber end boot doors tightly covered and with vehicle DLC cable connected - Chemical Immunity against typical service bay chemical exposure - RoHS hazardous substance compliance

Chapter

6

Care and Maintenance

Periodically the VCMM, its connectors, cables and peripherals should be inspected and cleaned after usage. Make sure that the VCMM is **NOT** connected to any power source (e.g., vehicle DLC, AC Adapter or PC USB port) during cleaning. Follow the cleaning tips outlined below:

- Always use water or a mild detergent solution applied to a soft cloth to clean the VCMM unit and dry thoroughly.
- Never use petroleum base solvents which can damage the VCMM finish, labels and plastic components.
- Inspect all cables and peripherals for any possible damage (i.e., cuts, abrasions, excessive wear).
- Inspect all VCMM and cable connectors and connector pins for bent, broken or missing pins. Look for the presence of any contamination such as dirt, grease or corrosion, and remove them with a mild detergent solution applied to a soft cloth and dry thoroughly.
- Store the VCMMI and its cables and peripherals in a dry area away from solvents and other liquids.
- If equipment is used in a manner not specified by the manual, the protection provided by the equipment may be impaired.

Chapter 7

VCMM (MTS 5440) Product Warranty

The VCMM (MTS 5440) is warranted by Bosch Automotive Service Solutions Inc. (“Bosch”) to the original consumer to be free of defects in material or workmanship under normal use for a period of two years. The warranty period of the VCMM cables, adapters and accessories is one year. Some countries may have agreements that extend beyond these periods. Contact your regional technical support regarding extended Hardware Protection.

The warranty period is from the date of shipment to the original consumer. If a product is found to be defective during the applicable Warranty Period, the product can be returned to an authorized Bosch Service Center and Bosch will, at its option and without charge, repair or replace any unit that proves defective under conditions of normal use. This warranty does not cover and shall be void for defects or damages resulting from casualty, accident, transportation, misuse or abuse, neglect, alterations, service or repair by any party other than Bosch or an authorized Bosch Service Center, improper installation, operation or maintenance, improper connections with peripherals, or other causes not arising out of defects in materials or workmanship. This Warranty does not cover Products used as short term rental or leased equipment. Bosch is not responsible for damage to or loss of any programs, data, or removable storage media, whether it occurs during warranty or other repair service. The Warranty does not cover any part that has been abused, altered, used for a purpose other than that which it was intended, or used in a manner inconsistent with instructions regarding its use, including but not limited to the following:

- Damage due to improper product operation or product modification.
- Damage due to use of non-Bosch supplied cables and accessory items, or unauthorized peripheral equipment.
- Damage due to dropping or other severe impact to the product.
- Damage due to exposure to excessive temperatures.
- Damage or loss that may occur during shipping.

This warranty also excludes all incidental or consequential damages. Warranty on replaced parts is the balance of the warranty period, or 90 days, whichever is longer.

Bosch shall have the right to request reasonable evidence of and impose reasonable requirements for submission of a warranty claim.

THIS WARRANTY IS IN LIEU OF ALL CONDITIONS OR WARRANTIES, EXPRESS, IMPLIED OR STATUTORY INCLUDING BUT NOT LIMITED TO ANY IMPLIED CONDITIONS OR WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THE PART OF SELLER, ITS SUPPLIERS OR SERVICE PROVIDERS. ALL IMPLIED OR STATUTORY WARRANTIES TO THE EXTENT THAT THEY CANNOT BE EXCLUDED ARE LIMITED TO THE

EFFECTIVE PERIOD OF THE EXPRESS WARRANTY SET FORTH HEREIN. IF THE PRODUCT IS DEFECTIVE IN MATERIALS OR WORKMANSHIP, BUYER'S SOLE AND EXCLUSIVE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. HOWEVER IF THAT REMEDY FAILS OF ITS ESSENTIAL PURPOSE, SELLER RESERVES THE RIGHT TO REFUND THE PURCHASE PRICE OF THE PRODUCT(LESS A DEDUCTION FOR USAGE VALUE) TO THE BUYER IN EXCHANGE FOR THE RETURN OF THE PRODUCT. SELLER, ITS SUPPLIERS AND SERVICE PROVIDERS SHALL NOT BE LIABLE FOR ANY DAMAGES INCLUDING, BUT NOT LIMITED TO, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSS OF USE OR DATA, LOSS OF PROFITS OR INTERRUPTION OF BUSINESS, WHETHER SUCH ALLEGED DAMAGES ARE BASED IN WARRANTY, TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY, BUT EXCLUDING PERSONAL INJURY), CONTRACT, OR INDEMNITY. EXCEPT TO THE EXTENT PROHIBITED BY LAW, THIS IS THE EXCLUSIVE WRITTEN LIMITED WARRANTY OF THE ORIGINAL BUYER.