

Vehicle Cockpit Unit (VCU)

Technical Description and Installers Manual

Model : VCURH1



This technical manual is intended for usage in the context of regulatory approvals (please ensure that the correct model-name reference is used).

It does not replace a vehicle- or region-specific OEM owners or user manual.

It is the OEMs responsibility (General Motors) to ensure that all mandatory information with regulatory relevance is made available to end-customers in the owners and user manuals.

Business name of device manufacturer:	Robert Bosch GmbH
Address:	Robert Bosch GmbH Robert-Bosch-Platz 1 70839 Gerlingen Germany
Brand:	Bosch

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DEVICE DESCRIPTION

General Motors' ("GM") Vehicle Cockpit Unit (VCU) 1.0 is a technology upgrade for the previous generation GM Cockpit ECU platform ("Info 3.x").

The GM Vehicle Cockpit System ("VCS") is responsible for the user experience in the cockpit of GM vehicles.

The VCU is a silver box solution providing interfaces to displays, speakers, sensors and optional components of the VCS.

The VCU, provides the following capabilities:

- Vehicle and infotainment related information to the slim-IPC, ICS, auxiliary, HVAC, and HUD displays. This includes processing of various vehicle camera viewing streams to certain displays.
- Audio capability that includes processing various radio broadcasts to the vehicle, voice capturing using microphone inputs, user media playback via phone or USB, and integrating audio enhancements (for example ANC) using microphone inputs.
- Wi-Fi, Bluetooth, and GPS connectivity.
- Various analog and digital I/O, including but not limited to switches, HUDs, sensors, etc.

It supports two major GM electrical vehicle architectures (called "Global B" and "CLEA") and is offered in two major product variants: "MID" and "HIGH". In terms of regional support, a distinction is made between North America ("NA"), China ("CN") and RestOfWorld ("RoW") configurations.

The VCU hardware is based on a two-processor approach where Qualcomm's latest ARM-based automotive system-on-chip (SoC) family 8195 (High) and 8155 (Mid) acts as core computing element and Renesas Electronics' latest automotive micro-controller RH850F1KM/KH (Vehicle Interface Processor, VIP) is used for real-time processing needs.

The VCU software architecture is mainly based on 3 run-time environments (called SW domains):

- Running on VIP:
 - AUTOSAR OS as real-time processing system
- Running on SoC:
 - Blackberry Hypervisor V2.x based on QNX7.x to realize a host environment and guest environment as virtual machine
 - Host: QNX7.x operating system
 - Guest: Android system based on Linux kernel

The VCU can determine its geographical location:

- In the VCURH1 device, the positioning information is provided by the GNSS chip internal to VCU

Operational conditions of the device:

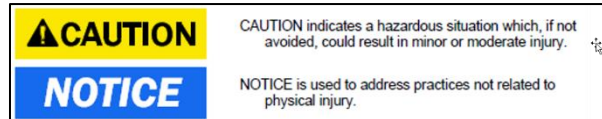
- Nominal supply voltage: 13.5 V DC
- Extended voltage range: 6.0 V to 16.0 V DC
- Max. Current consumption: <15A
- Nominal supply current: 1 ... 2 A
- Sleep current consumption: <200µA
- Speaker output: 40hm with 13,5V → 21W (10%THD).
- Operating Temperature Range: -40°C to +85°C (Note: Feature degradation expected from +50°C)
- Storage Temperature: -40°C to +85°C
- IP protection class: IP5K2
- ASIL level: B
- Device class: Class B
- Lowest internal frequency 1Hz
- Highest clock frequency for data bus connected of external display: 7.55 GHz

External Antenna Information:

Description	External WiFi Antenna
Manufacturer	TE Connectivity
Part number	2310901
Antenna Type	Dipole printed (Passive unfiltered)
Antenna Pigtail Length	125 mm
Antenna Pigtail Type	RG174LL
Specified coax length from pigtail connection to radio connection	1 - 1.5 m
Coax type	RTK044
Antenna Frequency Ranges	2.4 GHz (2401-2483) and 5 GHz (5-5.9)

SAFETY AND WARNING NOTES

This paragraph contains important safety and warning notes for handling and operating the device in series applications.



CAUTION

- The product is intended, and has been approved, for installation and operation in vehicles with a rated voltage of 12 volts. It may be necessary to adapt the product's factory-set state to suit the specific country.
- Only connecting cables and external devices that are appropriate for the device in question may be used (e.g.: proper current carrying capability, proper EMC shielding, flammability verified with appropriate certificates). Compliance with the applicable standards can no longer be guaranteed if the device – including the software – is modified without the agreement of Bosch.
- Bosch assumes no responsibility for damage as a result of incorrect indicators/displays. These may arise if the device has not been connected or has been incorrectly connected, or if the device receives false or erroneous signals from the system.

NOTICE

- Do not cover ventilation openings and heat sinks. Otherwise, a build-up of heat that could lead to malfunction may occur in the device.
- Do not insert foreign bodies into the insertion slots or openings of the device. Injury, or damage to the device, may occur otherwise.
- The device must not come into contact with hot or burning objects (e.g. cigarettes).
- Never use hard or sharp objects that could scratch or damage the protective pane or housing to clean the device. Do not use aggressive cleaning agents such as thinners, gasoline, abrasive cleaners, spray cleaners, acidic or alkaline solutions, or wax. Do not spray any liquids onto the device. To clean the housing, moisten a soft cloth with tepid water and wipe off the dirt. Make sure that no liquid enters the inside of the device. Afterwards, wipe the cleaned surface with a clean, dry cloth.
- The housing/surface of the VCU may be very hot when the device is operational. Please exercise caution and use appropriate protective equipment (PPE).

OPERATING MODES AND WIRELESS CHARACTERISTICS

Bluetooth and WiFi can work together. The device operates with two Antennas (one internal and one external Antenna). Bluetooth signals are sent over the internal Antenna. WiFi signals are sent over both, internal and external Antenna.

A Bluetooth and WiFi combined module is integrated in the VCU: Alps UGKZDA2001AC.

Bluetooth

- Bluetooth operates in the 2.4 GHz band (2402 ~ 2480)
- Bluetooth works in both the BDR and EDR
- In the VCU the Bluetooth operates in the Classic and Low Energy modes. Bluetooth operates in the 2.4GHz ISM Band: (2402 – 2480MHz)

WiFi

In the VCU, the WIFI has the following operating Modes. The device can connect to the external Access points in Station mode. The device can also operate as an Access point.

Used WLAN Modes:

- Station Mode (STA)
 - Device does not connect to external AP on DFS Channels
- Access Point Mode (AP)
 - DFS channels are not used

INSTALLATION

Please follow the safety and warning notices as documented above when handling and installing this device.

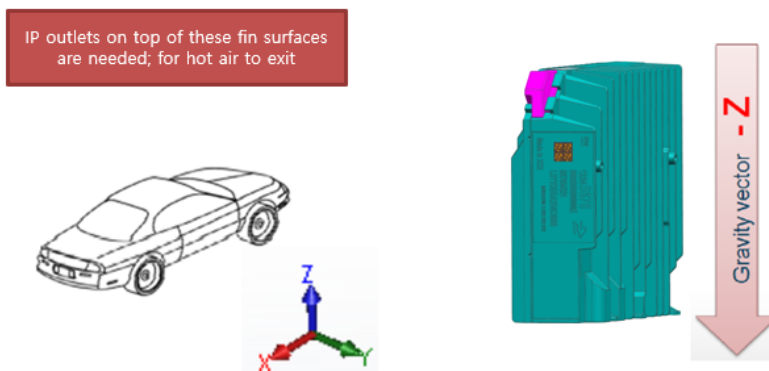
The VCU will be installed behind the dashboard (e.g. behind glove box) and is not exposed to the cabin. It will be fixed to the vehicle using a plastic bracket which is carline specific.

Exact mounting location of the VCU and its peripherals is carline specific. The below picture shows an schematic / example.

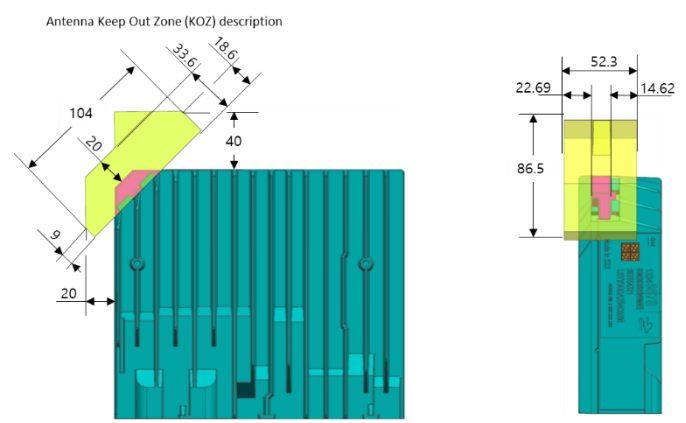


VCU Example VCU and external antenna mounting location

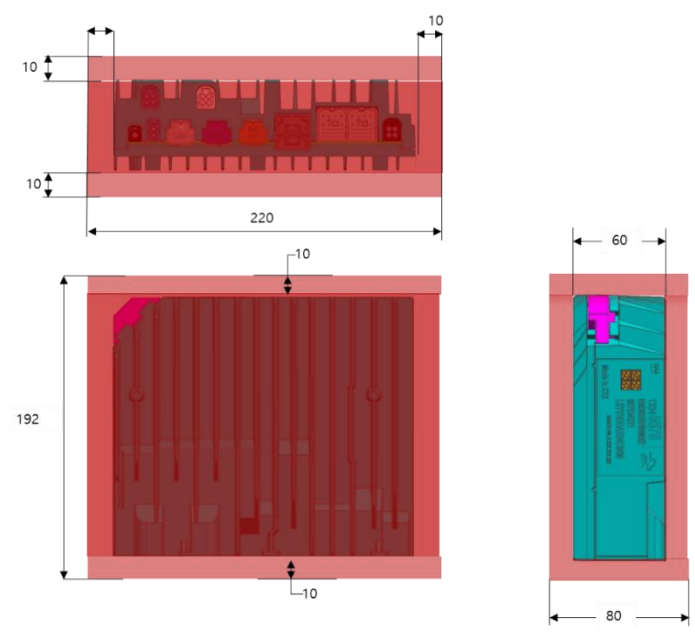
Mounting direction shall be vertical with the connectors facing down and with the antenna pointing up towards the vehicle compartment as shown below.



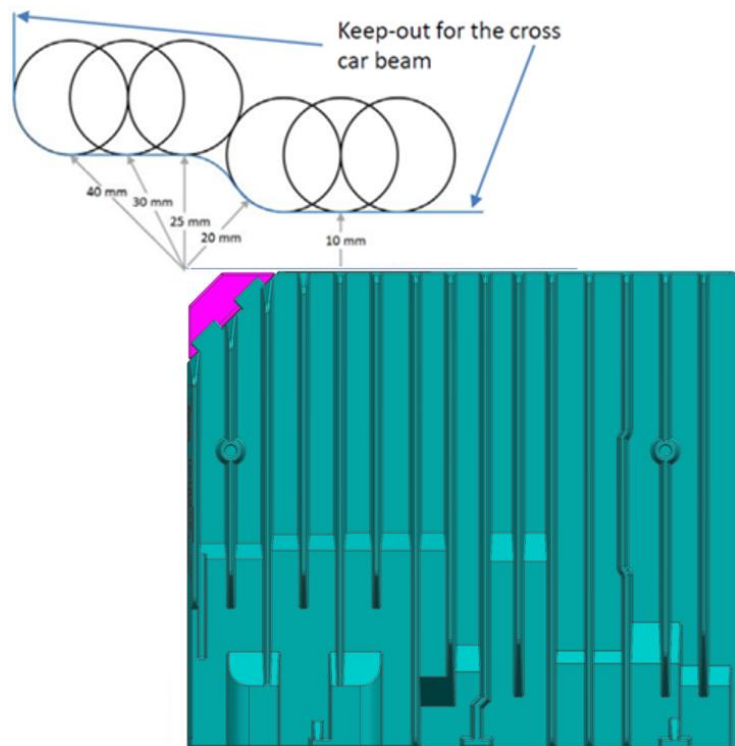
The OEM shall adhere to the below depicted keep-out zones when designing the packaging and when mounting the VCU in individual carlines during production.



VCU Antenna Keep-Out Zone



VCU Mandatory (Minimum) Thermal Keep-Out Zone



VCU Mandatory (Minimum) Keep-Out Zone for metal cross-vehicle beam

Additional Installation Requirements:

- Cable length's to external Antenna: 1 – 1.5 m.
- Distance external Antenna to VCU (center of gravity): 55cm
- Distance from center of external antenna to the center of internal antenna: 50 cm
- Minimal permissible distance¹ VCU internal / external Antenna and nearest interior Class-A surface²: 201.3 mm

¹ Measured from antenna dipol.

² Class-A interior surface is any high-quality component that a passenger inside a vehicle can see, touch, or engage with

CERTIFICATION NOTICES AND REGULATORY VERBIAGE

General Notices

Component Name: GM VCU 1.0
Type Designation: Cockpit Integration Platform ("CIP")

Model Name: **VCURH1**
Certificate Holder: Robert Bosch GmbH
Address: Robert-Bosch-Platz 1
70839 Gerlingen
Germany

This equipment shall be installed and operated according to the above defined installation requirements including the minimum distance between the VCU internal / external antenna and the nearest interior Class-A surface of 201.3 mm.

Information for Regions governed by CE

Robert Bosch GmbH declares on October ???, 2023 that the radio Equipment VCURH1 is in compliance with Directive 2014/53/EU.

EU Type Examination Certificate Number: ?????

The following information shall be included by the OEM whenever required by a regulation:

- Safety Hints
- Table of used frequencies and Antennas (transmitting power + Gain + Antenna type + description if it is an internal or external antenna)
- SAR Hints (safe distance for use) /// (If the radiating power of the radio modules >20dBm and the distance between the body and the device is <20 cm the SAR Value must be printed into the manual)
- reduced declaration of conformity (in all 28 national EU languages + additional countries like Turkey)
- List of restrictions in use
- CE sign
- description of the Temperature range for the planned use and any kind of degradation within this range

The following notices³ shall be included by the OEM in the end user manual of the VCU.

³ Replace [Name of manufacturer] by name of type approval owner
Replace [model name] by name of product e.g., HMI2.17
Replace [link] by internet address where the full text of the EU DoC can be obtained e.g.
<https://eu-doc.bosch.com/>

Country	ITU-Code (2 Digit)	ISO-Code	RED - Directive / technical rule	Text RED simplified EU DoC
Austria	AT	DE	2014/53/EU	Hiermit erklärt [Name of manufacturer], dass der Funkanlagentyp [model name] der Richtlinie 2014/53/EU entspricht. Der vollständige Text der EU-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar: [link]
Belgium	BE	FR	2014/53/UE	Le soussigné, [Name of manufacturer], déclare que l'équipement radioélectrique du type [model name] est conforme à la directive 2014/53/UE. Le texte complet de la déclaration UE de conformité est disponible à l'adresse internet suivante:[link]
Bulgaria	BG	BG	2014/53/EC	С настоящото [Name of manufacturer] декларира, че този тип радиосъоръжение [model name] е в съответствие с Директива 2014/53/ЕС. Цялостният текст на ЕС декларацията за съответствие може да се намери на следния интернет адрес: [link]
Cyprus	CY	EL	2014/53/EE	Με την παρούσα ο/η [Name of manufacturer], δηλώνει ότι ο ραδιοεξοπλισμός [model name] πληροί την οδηγία 2014/53/ΕΕ. Το πλήρες κείμενο της δήλωσης συμμόρφωσης ΕΕ διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο: [link]
Czech Republic	CZ	CS	2014/53/EU	Tímto [Name of manufacturer] prohlašuje, že typ rádiového zařízení [model name] je v souladu se směrnicí 2014/53/EU. Úplné znění EU prohlášení o shodě je k dispozici na této internetové adrese: [link]
Germany	DE	DE	2014/53/EU	Hiermit erklärt [Name of manufacturer], dass der Funkanlagentyp [model name] der Richtlinie 2014/53/EU entspricht. Der vollständige Text der EU-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar: [link]
Denmark	DK	DA	2014/53/EU	Hermed erklærer [Name of manufacturer], at radioudstyrstypen [model name] er i overensstemmelse med direktiv 2014/53/EU. EU-overensstemmelseserklæringens fulde tekst kan findes på følgende internetadresse: [link]
Estonia	EE	ET	2014/53/EL	Käesolevaga deklareerib [Name of manufacturer], et käesolev raadioseadme tüüp [model name] vastab direktiivi 2014/53/EL nõuetele. Eli vastavusdeklaratsiooni täielik tekst on kättesaadav järgmisel internetiaadressil: [link]
Spain	ES	ES	2014/53/UE	Por la presente, [Name of manufacturer] declara que el tipo de equipo radioeléctrico [model name] es conforme con la Directiva 2014/53/UE. El texto completo de la declaración UE de conformidad está disponible en la dirección Internet siguiente: [link]
Finland	FI	FI	2014/53/EU	[Name of manufacturer] vakuuttaa, että radiolaitetyyppi [model name] on direktiivin 2014/53/EU mukainen. EU-vaatimustenmukaisuusvakuutuksen täysimittainen teksti on saatavilla seuraavassa internetosoitteessa: [link]

France	FR	FR	2014/53/UE	Le soussigné, [Name of manufacturer], déclare que l'équipement radioélectrique du type [model name] est conforme à la directive 2014/53/UE. Le texte complet de la déclaration UE de conformité est disponible à l'adresse internet suivante: [link]
Greece	GR	EL	2014/53/EE	Με την παρούσα ο/η [Name of manufacturer], δηλώνει ότι ο ραδιοεξοπλισμός [model name] πληροί την οδηγία 2014/53/EE. Το πλήρες κείμενο της δήλωσης συμμόρφωσης EE διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο: [link]
Croatia	HR	HR	2014/53/EU	[Name of manufacturer] ovime izjavljuje da je radijska oprema tipa [model name] u skladu s Direktivom 2014/53/EU. Cjeloviti tekst EU izjave o sukladnosti dostupan je na sljedećoj internetskoj adresi: [link]
Hungary	HU	HU	2014/53/EU	[Name of manufacturer] igazolja, hogy a [model name] típusú rádióberendezés megfelel a 2014/53/EU irányelvnek. Az EU-megfelelőségi nyilatkozat teljes szövege elérhető a következő internetes címen: [link]
Ireland	IE	EN	2014/53/EU	Hereby, [Name of manufacturer] declares that the radio equipment type [model name] is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: [link]
Italy	IT	IT	2014/53/UE	Il fabbricante, [Name of manufacturer], dichiara che il tipo di apparecchiatura radio [model name] è conforme alla direttiva 2014/53/UE. Il testo completo della dichiarazione di conformità UE è disponibile al seguente indirizzo Internet: [link]
Lithuania	LT	LT	2014/53/ES	Aš, [Name of manufacturer], patvirtinu, kad radijo įrenginių tipas [model name] atitinka Direktyvą 2014/53/ES. Visas ES atitikties deklaracijos tekstas prieinamas šiuo interneto adresu: [link]
Luxembourg	LU	FR	2014/53/UE	Le soussigné, [Name of manufacturer], déclare que l'équipement radioélectrique du type [model name] est conforme à la directive 2014/53/UE. Le texte complet de la déclaration UE de conformité est disponible à l'adresse internet suivante: [link]
Latvia	LV	LV	2014/53/ES	Ar šo [Name of manufacturer] deklarē, ka radioiekārta [model name] atbilst Direktīvai 2014/53/ES. Pilns ES atbilstības deklarācijas teksts ir pieejams šādā interneta vietnē: [link]
Malta	MT	MT	2014/53/UE	B'dan, [Name of manufacturer], niddikjara li dan it-tip ta' taghmir tar-radju [model name] huwa konformi mad-Direttiva 2014/53/UE. It-test kollu tad-dikjarazzjoni ta' konformità tal-UE huwa disponibbli f'dan l-indirizz tal-Internet li ġej: [link]
Netherlands	NL	NL	2014/53/EU	Hierbij verklaar ik, [Name of manufacturer], dat het type radioapparatuur [model name] conform is met Richtlijn 2014/53/EU. De volledige tekst van de EU-conformiteitsverklaring kan worden geraadpleegd op het volgende internetadres: [link]
Poland	PL	PL	2014/53/UE	[Name of manufacturer] niniejszym oświadcza, że typ urządzenia radiowego [model name] jest zgodny z dyrektywą 2014/53/UE. Pełny tekst deklaracji zgodności UE jest dostępny pod następującym adresem internetowym: [link]

Portugal	PT	PT	2014/53/UE	O(a) abaixo assinado(a) [Name of manufacturer] declara que o presente tipo de equipamento de rádio [model name] está em conformidade com a Diretiva 2014/53/UE. O texto integral da declaração de conformidade está disponível no seguinte endereço de Internet: [link]
Romania	RO	RO	2014/53/UE	Prin prezenta, [Name of manufacturer] declară că tipul de echipamente radio [model name] este în conformitate cu Directiva 2014/53/UE. Textul integral al declarației UE de conformitate este disponibil la următoarea adresă internet: [link]
Sweden	SE	SV	2014/53/EU	Härmed försäkrar [Name of manufacturer] att denna typ av radioutrustning [model name] överensstämmer med direktiv 2014/53/EU. Den fullständiga texten till EU-försäkran om överensstämmelse finns på följande webbadress: [link]
Slovenia	SI	SL	2014/53/EU	[Name of manufacturer] potrjuje, da je tip radijske opreme [model name] skladen z Direktivo 2014/53/EU. Celotno besedilo izjave EU o skladnosti je na voljo na naslednjem spletnem naslovu: [link]
Slovakia	SK	SK	2014/53/EÚ	[Name of manufacturer] týmto vyhlasuje, že rádiové zariadenie typu [model name] je v súlade so smernicou 2014/53/EÚ. Uplné EÚ vyhlásenie o zhode je k dispozícii na tejto internetovej adrese: [link]
Moldovia	MD	RO	Punerea la dispoziție pe piață a echipamentelor radio	Prin prezenta, [Name of manufacturer] declară că tipul de echipamente radio [model name] este în conformitate cu Reglementarea tehnică „Punerea la dispoziție pe piață a echipamentelor radio”. Textul integral al declarației de conformitate este disponibil la următoarea adresă de Internet: [link]
Turkey	TK	TR	2014/53/AB	İşbu belge; [Manufacturer name] telsiz ekipmanı tipinin [model name] 2014/53/AB sayılı Direktif'e uygun olduğunu beyan eder. AB uygunluk beyanının tam metni aşağıdaki internet adresinde mevcuttur: [link]

Additional Country Specific Requirements

USA

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.

To comply with FCC Exposure requirements the OEM is instructed by the Grantee to assure a minimum separation distance of 20 cm between the housing where the integrated antenna is located and any human body as documented in the filing.

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

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Canada

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

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

RF Exposure Information:

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.