



| **TELEMATICS**
MOBILE **INFORMATION** EXCHANGE

MiX 3000 Installation Guide



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1 Introduction

The MiX3000 series product, which is aimed on the easy-install and light fleet market. It consists mainly of an on-board computer, a modem, a GNSS, an accelerometer, Low Energy Bluetooth, 2 analogue inputs, serial ports (3 x CAN, L & K-Line, LIN, J1850/J1708 and RS232), 3 x LED, a relay drive and a buzzer.



The range includes variants with LTE CAT1/2G and CAT M1/2G modems. All these variants make use of the same PCB, the only difference is the modem to be populated and all the modems have the same footprint. There are various part IDs, but hereafter, the generic term, MiX 3000, will be used, unless a specific reference is required.

1.1 MiX 3000 Hardware Features

Digital/Analog Inputs	There are two analogue inputs that can be configured to monitor any device that generates a change in voltage, e.g. seat belts, headlights, refrigeration units, temperature sensors, emergency lights, doors, PTO, UDS, trailer coupling etc.
CAN	The system has three CAN inputs that support J1939 and OBDII CAN as a minimum. Only two of these can be used simultaneously.
GNSS	GPS and GLONASS available.
Bluetooth	Multiprotocol Bluetooth 5, ANT/ANT+ with 2.4 GHz transceiver Supported data rates: 1 Mbps, 2 Mbps Bluetooth low energy mode.
Accelerometer	3-axis is capable of measuring acceleration and deceleration data.
Positive drive	One positive drive with open-load detection and current sense diagnostics (current limited to 250 mA).
Internal backup battery	An internal battery provides backup power for short periods only when the unit is disconnected temporarily.
Buzzer and LED	A buzzer is available to provide feedback of the vehicle's status and to warn the driver if necessary. Three LED's to provide feedback on the status of the unit.
RTC	Real time clock (unit has battery backup).

2 Regulatory Compliance

2.1 Part 15 of FCC Rules

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.

No changes / modifications shall be made to the equipment without the manufacturer's permission as this may void the user's authority to operate the equipment.

This equipment complies with FCC radiation exposure limits for an uncontrolled environment. This equipment shall be installed and operated with a minimum distance of 20 cm (7.9 in) between users and/or bystanders and the device.

2.2 Directive 2014/53/EU – MiX 3400 and MiX 3410-B Statement of Compliance

Having regard to Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC, and in particular Articles 10(10) and 45(2), thereof, MiX Telematics hereby state that the radio module (EG912Y-EU) and (BG96) are not restricted in any of the European member states and we claim compliance as per testing according to harmonized standards below:

For MiX 3410-B (EG912Y-EU):

Health & Safety (Article 3.1(a):	EN 50665: 2017 (referencing EN 62311: 2018) RF Exposure IEC 62368-1: 2020+A11:2020 Electrical Safety
EMC (Article 3.1(b):	ETSI EN 301 489-1: V2.2.3 (2019-11) EMC for Radio Equipment ETSI EN 301 489-17: Draft V3.2.4 (2020-09) Broadband Data ETSI EN 301 489-19 : V2.2.0 (2020-09) GNSS Receivers ETSI EN 301 489-52 : V1.2.1 (2021-11) Cellular Communication
Radio Spectrum (Article 3.2):	ETSI EN 301 908-1: V15.1.1 (2020-09) covering LTE CAT M1 FDD Bands B1, B3, B7, B8, B20 and B28 ETSI EN 301 511: V12.5.1 (2017-03) Radiated Spurious Emissions in allocated GSM 900 and DCS 1800 bands ETSI EN 303 413: V1.2.1 (2021-04) GSM Harmonized EN for GNSS stations in the GSM 900 and DCS 1800 bands ETSI EN 300 328 : V2.2.2 (2019-07) Bluetooth Spurious Emissions
Other (Article 3.3) (if applicable):	N/A

For MiX 3400-B (BG96):

Health & Safety (Article 3.1(a):	EN 50665: 2017 (referencing EN 62311: 2018) RF Exposure IEC 62368-1: 2020+A11:2020 Electrical Safety
EMC (Article 3.1(b):	ETSI EN 301 489-1: V2.2.3 (2019-11) EMC for Radio Equipment ETSI EN 301 489-17: Draft V3.2.4 (2020-09) Broadband Data ETSI EN 301 489-19 : V2.2.0 (2020-09) GNSS Receivers ETSI EN 301 489-52 : V1.2.1 (2021-11) Cellular Communication
Radio Spectrum (Article 3.2):	ETSI EN 301 908-1: V15.1.1 (2020-09) covering LTE CAT M1 FDD Bands B1, B3, B5, B8, B20 and B28 ETSI EN 301 511: V12.5.1 (2017-03) Radiated Spurious Emissions in allocated GSM 900 and DCS 1800 bands ETSI EN 303 413: V1.2.1 (2021-04) GSM Harmonized EN for GNSS stations in the GSM 900 and DCS 1800 bands ETSI EN 300 328 : V2.2.2 (2019-07) Bluetooth Spurious Emissions
Other (Article 3.3) (if applicable):	N/A

The product must be installed in an IP20 environment as specified in sections 6.3 and 6.4 of this document. Regarding article 10(2), the MiX 3410-B and MiX 3400-B have been constructed that it can be used in at least one Member State.

The following radio frequencies are used in both MiX 3400-B and MiX 3410-B:

Type of Radio Interface	Transmit Frequency [MHz]	Receive Frequency [MHz]	Power [dBm]
GSM 850 MHz (B5)	824 - 849	869 - 894	33
E-GSM 900 MHz (B8)	880 - 915	925 - 960	33
DCS 1800 MHz	1710 -1785	1805 - 1880	30
PCS 1900 MHz	1850 - 1910	1930 - 1990	30

SRD434	434.1 - 434.5	434.1 - 434.5	<10
Bluetooth BLE	2402 - 2480	2402 - 2480	<5

The following radio frequencies (LTE) are used in MiX 3410-B

Type of Radio Interface	Mode	Transmit Frequency [MHz]	Receive Frequency [MHz]	Power [dBm]
LTE Cat 1 B1	FDD	1920 - 1980	2110 - 2170	23
LTE Cat 1 B3	FDD	1710 - 1785	1805 - 1880	23
LTE Cat 1 B5	FDD	824 - 849	869 - 894	23
LTE Cat 1 B7	FDD	2500 - 2570	2620 - 2690	23
LTE Cat 1 B8	FDD	880 - 915	925 - 960	23
LTE Cat 1 B20	FDD	832 - 862	791 - 821	23
LTE Cat 1 B28	FDD	703 - 748	758 - 803	23
LTE Cat 1 B38	TDD	Downlink only	2570 - 2620	23
LTE Cat 1 B40	TDD	Downlink only	2300 - 2400	23
LTE Cat 1 B41	TDD	Downlink only	2496 - 2690	23

The following radio frequencies (LTE) are used in MiX 3400-B:

Type of Radio Interface	Mode	Transmit Frequency [MHz]	Receive Frequency [MHz]	Power [dBm]
LTE Cat 1 B1	FDD	1920 - 1980	2110 - 2170	23
LTE Cat 1 B2	FDD	1850 - 1910	1930 - 1990	23
LTE Cat 1 B3	FDD	1710 - 1785	1805 - 880	23
LTE Cat 1 B4	FDD	1710 - 1755	2110 - 2155	23
LTE Cat 1 B5	FDD	824 - 849	869 - 894	23
LTE Cat 1 B8	FDD	880 - 915	925 - 960	23
LTE Cat 1 B12	FDD	699 - 716	729 - 746	23
LTE Cat 1 B13	FDD	777 - 787	746 - 756	23
LTE Cat 1 B18	FDD	815 - 830	860 - 875	23
LTE Cat 1 B19	FDD	830 - 845	875 - 890	23
LTE Cat 1 B20	FDD	832 - 862	791 - 821	23
LTE Cat 1 B26	FDD	814 - 849	859 - 894	23
LTE Cat 1 B28	FDD	703 - 748	758 - 803	23

2.3 California Proposition 65



WARNING:

This product can expose you to chemicals including Carbon black and Nickel, which are known to the State of California to cause cancer, and including Bisphenol A and 1,3-Butadiene, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

3 Product Variants and Part Numbers

Modem	Technology	P/N	Model	Model	Region
EG915U-LA	LTE CAT1/2G	U0131MT	MiX 3440-B	MiX 3440 Electronic Unit (EU) with Backup Battery and Quectel EG915U-LA modem	2 (LATAM)

		U0132MT		MiX 3440-B Universal OBDII Kit. Contains EU U0131MT and OBDII Harness A0061MT	
		U0133MT		MiX 3440-B Universal J1939 Kit. Contains EU U0131MT and Universal J1939 Harness A0062MT	
BG96	LTE Cat M1/2G	U0051MT	MiX 3400-B	MiX 3400 Electronic Unit (EU) with Backup Battery and Quectel BG96 modem	2 (AT&T)
		U0052MT		MiX 3400-B Universal OBDII Kit. Contains EU U0051MT and OBDII Harness A0061MT	
		U00121MT		MiX 3400-B Universal J1939 Kit. Contains EU U0051MT and Universal J1939 Harness A0062MT	
BG96	LTE Cat M1/2G	U0142MT	MiX 3400-B (VZN)	MiX 3400 Electronic Unit (EU) with Backup Battery and Quectel BG96 modem	2 (Verizon)
		U0143MT		MiX 3400-B Universal J1939 Kit. Contains EU U0142MT and Universal J1939 Harness A0062MT	
BG96	LTE Cat M1/2G	U0140MT	MiX 3400-B (TLA)	MiX 3400 Electronic Unit (EU) with Backup Battery and Quectel BG96 Cat M1 modem (with Telstra modem FW)	3 Australia (Telstra)
		U0141MT		MiX 3400-B Universal OBDII Kit. Contains EU U0140MT and OBDII Harness A0061MT	
EG912Y-EU	LTE CAT1/2G	U0055MT	MiX 3410-B	MiX 3410 Electronic Unit (EU) with Backup Battery and Quectel EG912Y-EU modem	1 & 3 (Europe/Africa/ Asia/AU/NZ)
		U0056MT		MiX 3410-B Universal OBDII Kit. Contains EU U0055MT and OBDII Harness A0061MT	
		U0122MT		MiX 3410-B Universal J1939 Kit. Contains EU U0055MT and J1939 Harness A0062MT	

Peripherals

Part ID	Picture	Description
A0061MT	 A black OBDII plugin harness for light vehicles, packaged in a clear plastic bag. Two white labels are attached to the bag, both containing the text: 'MiX 3000 Universal OBDII Plugin Harness', 'A0061MT', and '1B CO 41/2021'.	MiX 3000 Universal OBDII Plugin Harness for light vehicles
A0062MT	 A black J1939 plugin harness for heavy vehicles, packaged in a clear plastic bag. A white label is attached to the bag, containing the text: 'MiX 3000 Universal J1939 Plugin Harness', 'A0062MT', and '1B CO 41/2021'.	MiX 3000 Universal J1939 Plugin Harness for heavy vehicles

3.1 MiX 3000 Power Requirements

The MiX 3000 is designed for use in 12V or 24V vehicles. Special vehicles and working machines with voltages above 33V will require a voltage converter to facilitate the required power supply input.

4 Safety - read before installation

4.1 Installer Requirements

- The MiX 3000 is designed to enable an easy install.
- Installers should consult the vehicle manufacturer's documentation for the specific vehicle make and model prior to undertaking an installation.

After installation, verify that no interference is caused to the vehicle's electrical system. Check dashboard warning lights and error messages. Should any error conditions exist, remove the installed unit and contact MiX Telematics for assistance.

4.2 Tools

Standard technical equipment and appropriate tools for use with vehicles are required to install the MiX 3000.

Vehicle specific tools may be required for the removal of consoles and covers.

4.3 Secure the workplace

- Remove the ignition key from the vehicle's ignition lock.
- Ensure that the vehicle's engine cannot be unintentionally started during the installation.
- Short-circuiting the vehicle's electrical system may result in fire, explosion of the battery and/or damage to other electrical systems.
- For electric vehicles, electrical shock from high voltage batteries must be avoided, as this may lead to death or injury.

4.4 ESD - Installation Handling Precautions

Prior to touching the PCB, inserting a new SIM or replacing the battery, always take ESD precautions:

- Either use an earthed wrist strap or touch a known earth point prior to handling the unit.
- If the PCB must be handled, avoid direct contact with any of the components and handle it by only touching the edges of the PCB.

5 Sim Card

5.1 Preparing the SIM card

Caution: Be careful to use only nano SIM (4FF) with the standard thickness. Cutting a micro SIM to a 4FF size may damage the SIM card holder.

Before inserting the SIM card, determine if the SIM needs to be secured with a unique PIN.

If a PIN secured SIM is required:

- Ensure that the SIM is configured as "PIN required".
- Ensure that the PIN is set as either 0000 or 00000.
- The MiX 3000 will change the PIN to a unique number that it calculates for the device.
- The SIM is then locked to the device and the PUK will be locked if inserted into another device.

If an unsecured SIM is required:

- Ensure that the SIM is configured as "PIN not required".
- The MiX 3000 will leave the SIM with this configuration.
- This SIM can be moved to a different device without risk of the PUK begin locked.

5.2 Inserting the SIM card

In order to insert the SIM card, the following steps must be followed:

- Observe ESD precautions as prescribed in section [4.4](#).
- The SIM card is accessible from the side of the enclosure.
- Insert the SIM card with copper pads facing upwards. See the diagrams below.

5.2.1 Open and close the unit

1. Hold the unit with the label facing downwards (MiX Telematics logo facing upwards). Slide open the SIM cover as illustrated in Figure 1 below.
2. Insert the SIM card with copper pads facing up as illustrated in Figure 2.
3. Ensure the SIM card is fully seated as indicated in Figure 3 (should click and then latch when fully seated).
4. Close the SIM cardholder door as indicated in Figure 4.



Figure 1: Open SIM card door

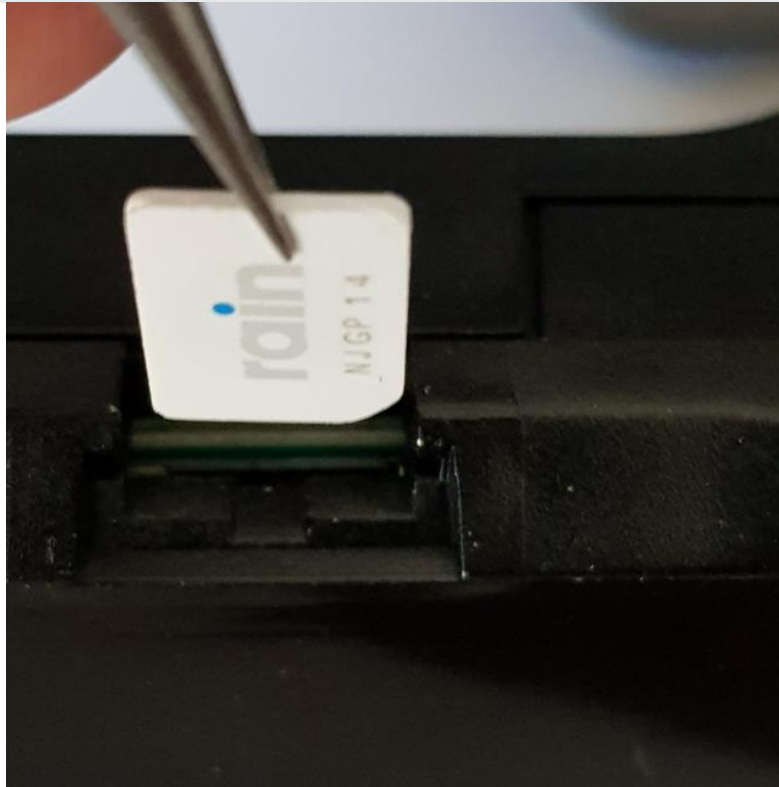


Figure 2: Insert SIM with Copper pads facing up

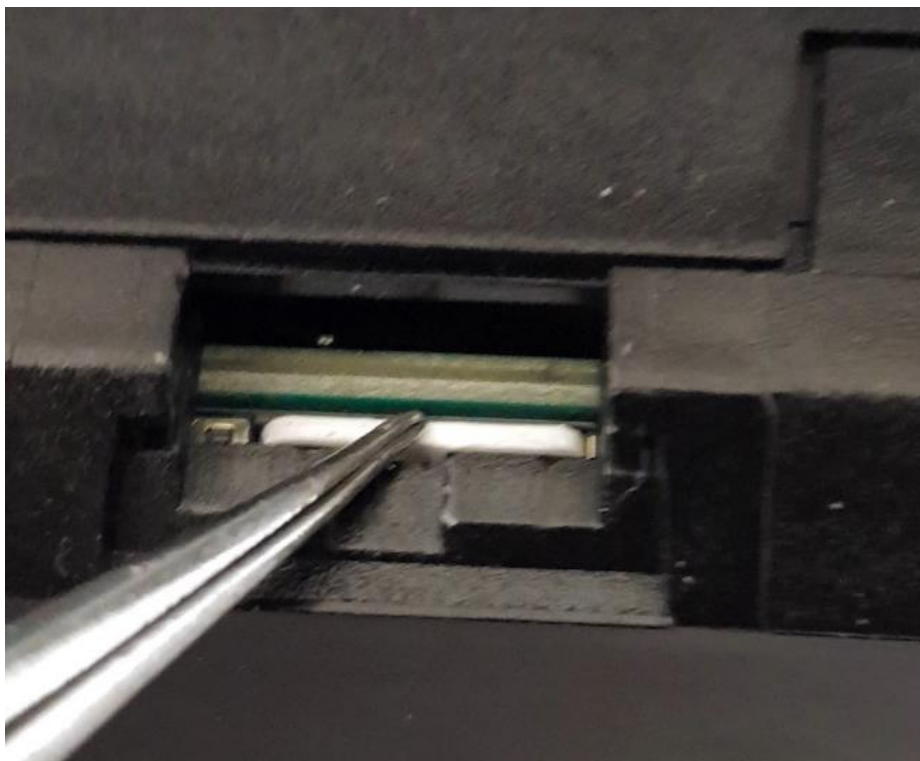


Figure 3: Insert SIM and gently push it till SIM latches (should click and latch when fully seated)



Figure 4: Close SIM cardholder door

5.3 Configuration of unit

The MiX 3000 is configured with default fleet settings during commissioning. It is possible to make over the air (OTA) changes to some settings via the MiX Fleet Manager software interface.

6 Installation

6.1 Installation Steps

Step	Action	Software Tools
1)	Ensure the SIM is correctly prepared (refer to section 5.1).	None
2)	Insert the SIM card (refer to ESD precautions in section 4.4). <i>The SIM card orientation is illustrated in section 5.2</i>	None
3)	Configure the unit.	MiX Fleet Manager
4)	Configure Bluetooth if applicable.	MiX TechTool
5)	Install the harness. (Section 6.5)	None
6)	If applicable, connect power and signal inputs. (Section 8 and Section 9)	None
7)	Test the installation. (Section 14)	Verify that the unit reports to the backend.
8)	Test GSM observing the LED flashing sequence (see 13.2)	None
9)	Test GNSS observing the LED flashing sequence (see 13.2)	None
10)	Install unit. (Section 7)	

On the MiX 3000, the unit maintains an on-board odometer. This starts at 0 km from the factory. An offset can be sent from the MiX Telematics Fleet Manager user interface to align the odometer value on the MiX 3000 unit with the vehicle odometer at installation time using “MiX TechTool”. An updated value can be sent at any time, over the air, from MiX Fleet Manager to realign these two values.

6.2 Installation Precautions

All components should be checked for damage prior to being installed into the vehicle.

Careful attention must be paid to the manufacturers’ safety regulations for all tools used.

6.3 Positioning of product components

Installers should ensure that the components of the product do not influence or hamper the functioning of the vehicle’s systems.

Due to possible RF interference, from devices that could be plugged in to lighter/auxiliary sockets, do not install the electronic unit closer than 30cm from any 12 V power outlets in the vehicles. Also take care that any external antenna is at least 60 cm away from any of these 12 V outlets.

Care should be taken to ensure that the product’s components are not damaged during installation.

Ensure that sufficient space is available for all components of the product, prior to commencing the installation.

Should the bracket be used to fix the unit to the vehicle, make sure that the unit and bracket are securely clipped together. Add a cable-tie around the complete housing and bracket assembly for a more secure mounting if required.

Avoid installing in known high-temperature areas, such as parts of the engine bay or near major heat sources. Also, do not install together with other electronic equipment in an enclosed box that would trap the heat and cause the temperature to rise.

- Operating range (limited by backup battery): -20 °C to + 65 °C
- Battery will only charge in the range 0 °C to + 45 °C

Ensure that the unit and harness are secured to prevent the harness vibrating differently to the unit at the harness connectors.

Correct orientation of the unit is important to ensure good GPS reception due to the internal GPS antenna being used. The unit should be mounted with the top side (where the MiX Telematics logo is engraved) facing up, and the label side down. (See Figure 5 below).

Additionally, it is advisable to install the unit in a location where the GPS view of the sky is relatively unobstructed by metal. Most vehicle boots for example, may form a metal cage, which prevents GPS reception. Placing it under the vehicle bonnet will also prevent good performance.

This side (with LEDs) facing up.



Figure 5 Unit orientated for GPS antenna to face towards the sky

- Please note that the voltage of the external relay (if applicable) is rated to the vehicle voltage specification. Do not run a 12 V relay at 24 V. The Relay Specifications are:
 - Coil current rating: < 200 mA
 - Coil Voltage Rating: Must match the vehicle battery supply
- Please pay attention to the routing course of cables and wiring.
- Do not install the product in or near the location of mechanical or electrical airbags.
 - Do not drill into supporting or stabilizing braces or beams.

⚠ Do not install this unit >2m in height in order to comply with safety regulations.

6.4 General Wiring Requirements

Note the product's wire gauge cross-sectional area. If the wire gauge cross-section is reduced, current density increases, which may cause the wiring to overheat.

- Cables should be routed in existing channels and should not be routed parallel to ignition cables or other cables subject to high current.
 - Cables should be fixed with cable-ties or adhesive tape.
- Do not route cables over moving parts or too close to the high voltage areas (like the spark plugs).
 - Do not fix cables on the steering column.
- Ensure that the cables are not exposed to pulling, pressure or shearing deformation.
- If the cables are routed through drilled holes, rubber grommets or similar protection should be used.

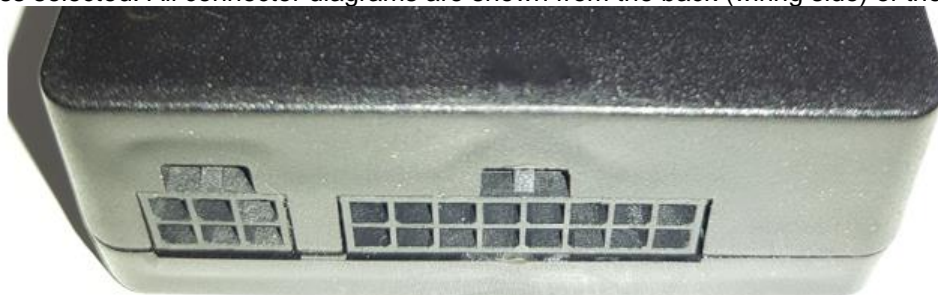
- Suitable cable-strippers should be used to strip insulating material from cables and cable-strippers should be adjusted to suit the wire gauge being stripped, to avoid damaging or separating the wire strands.
 - Cables should only be connected using solder or suitable crimping lugs.
 - A proper crimping tool should be used on all crimping lugs.
 - Careful attention must be paid to the manufacturers' safety regulations for all tools used.
- Insulate all exposed wires to prevent short-circuits. Use good quality adhesive tape or heat shrink (provided).
- Connections to vehicle power supply must be installed with a fuse (check if the main harness is fitted with a fuse).

Be aware that short-circuiting may be caused by faulty connections and crushed or damaged cables.

- Short-circuiting the vehicle's electrical system may result in fire, explosion of the battery and/or damage to other electrical systems. To prevent this, all connections carrying current must be soldered and insulated correctly. Other connections such as the speed signal, RPM signal, brake light or clutch switch can be made with crimping lugs.
- Incorrect connections can lead to short circuits. Connections should only be made in accordance with the vehicle's wiring diagram.
 - Current and voltage should be measured with a multi-meter or diode test lamp.
- The use of inadequate test equipment may result in damage to control devices or other electrical systems.
- Route the harness in such a way as to prevent water condensation that may form on the cable from running into the unit. This can be achieved by having the harness at a lower point just before it connects to the unit. If the back plate is lower than the rest of the unit, water can accumulate inside the unit with no way to escape. The unit should also never be exposed to direct water spray and jets.

6.5 Harnesses and connectors

Please read the Safety section (Section 4) of this document before installing the vehicle harness. Confirm which of the harnesses will be used in the installation, as the colour of the wires will differ depending on the harness selected. All connector diagrams are shown from the back (wiring side) of the harness.



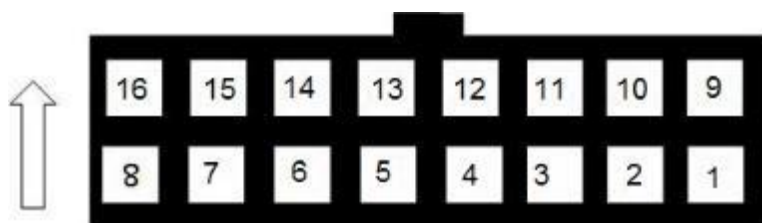
See the tables below for a numbered depiction (sections 6.5.2 and 6.5.3).

The pin layout and wire colours of the various harness options as well as detailed tables describing pin functions are shown below.

6.5.1 Harness Part Numbers

Part ID	Description
A0061MT	MiX 3000 Universal OBDII Plugin Harness for light vehicles
A0062MT	MiX 3000 Universal J1939 Plugin Harness for heavy vehicles
440FT0931	Serial Harness SR1

6.5.2 Main Harness



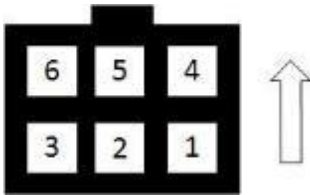
Connector viewed from the back (wiring side) of harness (A0061MT / A0062MT / A0066MT)

Note: This section is for information only. Using the supplied harnesses, the installer does not need to know this information. All the pins below are normally supplied on the vehicle diagnostic port.

PIN	Color	Name	Function	Application Information
1	RED	Vehicle+	Vehicle battery +	Connect to vehicle battery +12V to +24V. Must be protected with the provided 7.5 amp slow blow fuse, or a similar one already present in the vehicles wiring.
2	WHITE / VIOLET	ANALOG1	Analogue input 1	Maximum signal voltage is 38V. Do not connect signals from unsuppressed inductive sources such as relay coils (where severe voltage spikes can be generated)
3	YELLOW / RED	CAN3 P	CAN3 High	3 rd CAN Bus: Used to monitor supported CAN bus
4	GREEN / RED	CAN3 N	CAN3 Low	
5	BLUE	J1850+/J1708+	Serial	J1850+/J1708+
6	PINK	J1850-/J1708-	Serial	J1850-/J1708-
7	ORANGE	L-LINE	L-Line serial signal	Serial Communication
8	VIOLET	*LIN	LIN serial bus	Single-ended, one-wire interface that communicates at 20 kilobits per second.
9	BROWN	GND	Ground	Connect directly to vehicle ground. <i>Do not tap into an existing ground wire carrying high current.</i>
10	WHITE/RED	ANALOG2	Analogue input 2	Maximum signal voltage is 38V. Do not connect signals from unsuppressed inductive sources such as relay coils (where severe voltage spikes can be generated)
11	YELLOW	CAN1 P	CAN1 High	1 st CAN Bus: Used to monitor supported CAN bus
12	GREEN	CAN1 N	CAN1 Low	
13	GRAY	*K-LINE	K-Line serial signal	Serial communication
14	YELLOW/GREEN	BUZZOUT	Buzzer Output	Provides warning sounds
15	YELLOW/BLACK	CAN2 P	CAN2 High	2 nd CAN Bus: Used to monitor supported CAN bus
16	GREEN/BLACK	CAN2 N	CAN2 Low	

- Not currently supported

6.5.3 Serial Harness SR1



Connector viewed from the back (wiring side) of harness (440FT0931)

Pin	Colour (Prim/Sec)	Name	Function	Application Information
1	Yellow	TXD	RS-232 Transmit	
2	White	RXD	RS-232 Receive	
3	Blue	RTS	Ready to send	
4	Green	CTS	Clear to send	
5	Red	POSD1	Positive Drive 1	Load current must not exceed 250 mA. Output controlled by MiX 3000 and selected in Vehicle Properties of frontend user software.
6	Brown	GND	Ground	

6.5.4 GSM, GNSS and BT Antennae

The Modem, GNSS and BT antennae are all internal.

⚠ The Unit contains an internal Modem antenna and must be mounted more than 20cm away from the human body under normal operating conditions.

7 Positioning the MiX 3000 Unit in the vehicle

Note: Please follow the instructions, regarding the positioning of product components, as contained in the “Safety” section, of this document.

- The MiX 3000 plugs into the vehicle diagnostic port or J1939 diagnostics port or is wired directly into the vehicle, depending on the harness selected.
- The MiX 3000 must be installed inside the passenger compartment or the driver cabin, to protect it from possible damage by water, solvents, fuel or other environmental factors. This is also necessary if one makes use of the Bluetooth Driver ID device.
- The MiX 3000 should not be installed in or near the ventilation, heating system, or hot surfaces, which may cause it to overheat or be damaged by condensed water vapour. Also, do not install together with other electronic equipment in an enclosed box that would trap the heat and cause the temperature to rise.
- The MiX 3000 should be installed in a position where it will not be subjected to pressure, impact or excessive vibration. Uneven surfaces, where the box can be deformed or damaged should be avoided.
 - Select the installation position carefully before proceeding with the installation.
- Route cables from the unit to the appropriate sensors within the vehicle. Additional information can be found in the “Harness Installation” section (6.5 of this document).

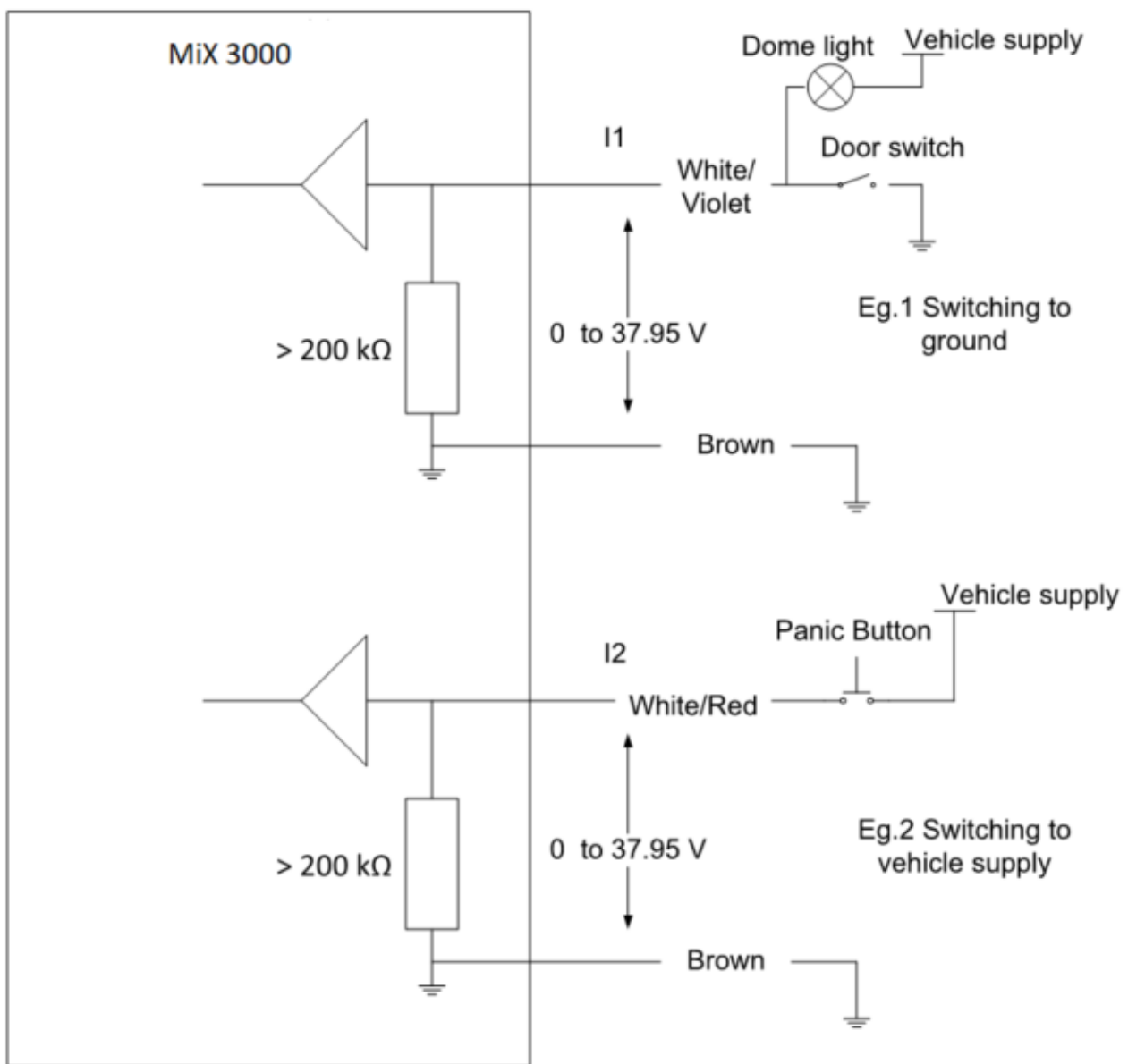
8 Signal Inputs

8.1 Digital Inputs

Note: The information below is only relevant if one uses a special wired harness (A0066MT).

The MiX 3000 is equipped with two analog inputs, which can be used to monitor digital signals. When the voltage threshold is crossed, an event is triggered. The voltage threshold and the hysteresis are set in software. Please refer to the section on “Harness Installation” for analogs: Pins 2,10 and 9 (GND) (Section 6.5) of this document, for more details. The external inputs and ignition line are protected from typical vehicle transients and can be directly connected to most vehicle inputs between 0 and 38V (37.95V). The input impedance is $>200\text{ k}\Omega$. Typical connections are shown below.

Note: There is no internal pull-up resistor in the MiX 3000, so observe the correct wiring configurations shown below for switching to ground or switching to vehicle supply.



9 Power Outputs

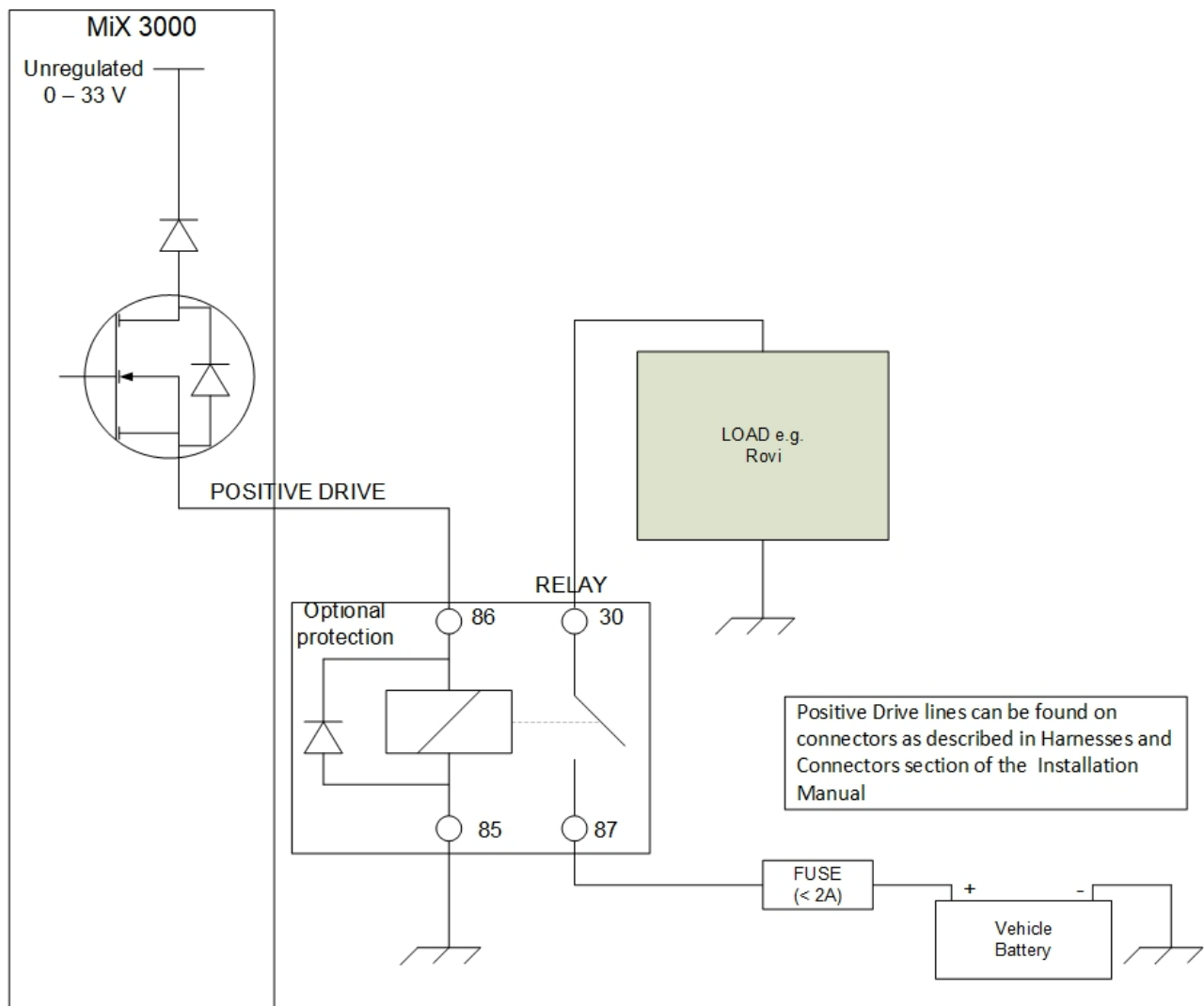
9.1 Positive Drive

The Positive Drive output supplies power to MiX 3000 accessories. There is one Positive Drive available.

- This output is controlled by the MiX 3000 and is configured in the vehicle properties of the Fleet Manager Application software.
 - Access to these outputs is described in section 6.5.3
 - Do NOT connect an external voltage to the positive drive line.

Positive drive is limited to 250 mA. These circuits are protected against over current and voltage.

Below is a functional block diagram that describes how to wire such a device.



10 Serial Communication

The MiX 3000 is equipped with one RS232 external serial port. Refer to section 6.5.3 for details of the wiring. The serial port can be used to connect to an external peripheral. It does RTS/CTS flow control, and is paired with POSD1. It is normally enabled, even when the vehicle is out of trip.

The serial port is capable of up to 115200 baud operation.

11 COMMUNICATION PROTOCOLS

11.1 Overview

Installation of MiX 3000 Communication lines:

- The device is connected to the vehicle communication bus via the vehicle diagnostic port using the supplied harness.
- The unit still needs to be configured for the vehicle in which it will be installed, and the vehicle ID and odometer still need to be configured. Specifically, the MiX 3000 may not record any CAN data until it is configured.

After installation, verify that no interference is caused to the vehicle's electrical system. Check dashboard warning lights and error messages. Should any error conditions exist, remove the MiX 3000 installation and contact MiX Telematics for assistance.

12 MiX TechTool

An Android and iOS version of "MiX TechTool" is available that can connect to the MiX 3000 via Bluetooth. Refer to the documentation on this tool for detailed instructions.

13 After Installation

13.1 Beep codes

The MiX 3000 has an output that drives a buzzer. The buzzer is not included inside the enclosure but is part of the 10-wire main harness. If any of the other reduced wire count main harnesses are installed, beep codes will not be audible.

The following beep codes will apply when a harness with an external buzzer is installed:

- Triple beep when an over speeding, harsh braking, harsh acceleration or harsh cornering event occurs.
- Continuous slow beeping at trip start for the duration of the user configured driver ID prompt period.

(When a valid driver ID is presented, two short beeps will sound and the slow prompt beeps will stop – Default driver ID prompt period is set to zero seconds, disabling the driver ID prompt).

This setting is under Software Configuration control, so the behaviour will depend on the configuration settings.

13.2 LED flash codes

The MiX 3000 has three LED's for diagnostic purposes. Refer to the illustrations below:



LED 1 (Top) – Asset Information

- Status of information from vehicle communication bus (CAN)



LED 2 (Middle) – Mobile Connection

- The unit's mobile network communication status



LED 3 (Bottom) – Tracking

- The GNSS (GPS) positioning and trip status

LED Pattern (every 2 seconds)

<div>Asset status</div> <div></div>	<div>Vehicle Bus</div> <div>Vehicle bus inactive in trip (no data timeout)</div> <div>Commissioning (comms)</div> <div>VIN Scan Busy</div> <div>Scan success, waiting for config</div> <div>Vehicle bus active</div> <div>OBC Power Mode</div> <div>OBC Stop Mode</div> <div>OBC Low Power Mode (peripherals off)</div> <div>Error (overrides normal patterns)</div> <div>No VCI hardware detected</div> <div>VIN Scan Failed</div> <div>Config received for VIN, no vehicle support</div>	<div></div>
<div>Mobile data</div> <div></div>	<div>Normal</div> <div>Modem Powered Down</div> <div>Searching for network</div> <div>Registered with SMS only</div> <div>Registered with GPRS active</div> <div>Registered with GPRS available</div> <div>Error (overrides normal patterns)</div> <div>No SIM detected</div> <div>SIM PUK</div> <div>SIM provisioning issue (registered but no data)</div> <div>Registration denied</div>	<div></div>
<div>Tracking</div> <div></div>	<div>Normal</div> <div>GNSS Module Powered Down</div> <div>No lock - in trip</div> <div>No Lock - out of trip</div> <div>2D Lock - in trip</div> <div>2D lock - out of trip</div> <div>3D lock - in trip</div> <div>3D lock - out of trip</div> <div>Functional Error (overrides normal patterns)</div> <div>Persistent GPS failure ie module/antenna</div>	<div></div>

14 Testing Installation

14.1 Test Drive

After the installation carry out a test drive and confirm that there is no abnormal behaviour.

15 Closing Steps

- Check all relevant vehicle functions.
- Explain the functions of the MiX 3000 system to the user.

16 Troubleshooting

The audible and visual information generated by the MiX 3000 are described in sections [13.1](#) and [13.2](#) of this document.

Symptom	Probable Cause	Action
Unit does not switch ON (Red LED does not lit)	No battery voltage applied to MiX 3000.	<ul style="list-style-type: none"> • Check the voltage supply to the MiX 3000. • Ensure the connectors are properly fitted. • Check fuse if applicable.

GPS does not get lock (GPS LED not GREEN)	<p>Orientation of the unit is incorrect.</p> <p>Location of unit is limiting good GPS reception (internal antenna).</p>	<ul style="list-style-type: none"> Mount the unit with the rounded surface facing up, and the label side down. Install the unit in a location where the GPS view of the sky is relatively unobstructed by metal or conductive parts.
GSM unable to register on network (see GSM LED flash codes in section 13.2)	<p>No SIM card inserted or SIM inserted the wrong way round.</p> <p>Automatic commissioning is not possible on the GSM network selected.</p> <p>GSM network is out of range.</p>	<ul style="list-style-type: none"> Refer to section 5.2 for the correct SIM card orientation. Alternatively replace the SIM card Use a serial configuration harness and the Configuration software to manually program APN and server settings for the unit Check coverage of chosen GSM network using coverage map or a cell phone on the same network If the MiX 3000 fails to detect a MiX approved GSM antenna it will switch to internal antenna operation.

17 Routine Maintenance

Item	Maintenance	Period
1)	The internal battery needs to be replaced when a replacement message is generated. Replace the battery if it is swollen.	Back End Warning Message

18 MiX 3000 Specifications

18.1 Technical description

Refer to the section on Product Variants and Part Numbers (Section 2) for more details.

18.2 Auxiliary inputs/outputs

2 x Configurable Analogue Inputs	<p>2 analogue can be configured to monitor any device that generates a change in voltage. E.g. seat belts, headlights, refrigeration units, temperature sensors, emergency lights, doors, PTO, UDS, trailer coupling etc.</p> <p>Voltages are measured in the range of 0 – 38V (37.95V) in steps of approximately 9.3 mV.</p> <p>Do not connect signals from unsuppressed inductive sources such relay coils (where severe voltage spikes can be generated).</p>
1 x RS232 Serial Interface	This can be connected to any RS232 serial device.

3 x CAN Interface	Support J1939 and OBDII CAN as a minimum, as well as single wire CAN. Only two busses can be operational simultaneously. Meets ISO 11898-2: 2016 and ISO 11898-5: 2007 Physical layer standards. Designed for use in CAN FD (Flexible Data Rate) networks up to 5 Mbps.
1 x Positive Drive	Positive Drive output is used to power external devices at a current up to 250 mA.
2 x K-line/ LIN	K-line serial interface (Data rate 1.2 to 10.4 Kbps) / LIN (up to 20 Kbps) <i>⚠ The K-line circuit is not designed for a scenario where the signal line is short circuited to vehicle supply for a prolonged period while transmitting data.</i>
1 x L-Line	Some K-Line interface works in conjunction with L-line (Data rate 1.2 to 10.4 Kbps)
1 x J1850/J1708	This bus is used for diagnostics and data sharing applications in vehicles. A 41.6 Kbps Pulse Width Modulated (PWM) two wire differential approach, or a 10.4 Kbps Variable Pulse Width (VPW) single wire approach.

19 Peripheral Power Manager

The MiX 3000 is equipped with outputs to power additional peripherals. When making use of the positive drive outputs, adjust the peripheral power management settings within the unit configuration to avoid excessive current draw from the peripherals when ignition is off.

Below are examples of standard and strict settings:

STANDARD POWER MANAGEMENT

Peripheral power management			
Automatic shutdown of peripheral devices	<input checked="" type="checkbox"/>		
- Turn peripheral devices off when asset is parked for more than	18	:	0 : 0 (64800 seconds)
After waking up, leave peripheral devices on for	0	:	15 : 0 (900 seconds)
Surfacing	<input checked="" type="checkbox"/>		
- Switch peripheral devices on every	4	:	0 : 0 (14400 seconds)
- Limit number of times to surface	<input checked="" type="checkbox"/>		
-- Only surface a maximum of	10	times	

STRICT POWER MANAGEMENT

Peripheral power management			
Automatic shutdown of peripheral devices <input checked="" type="checkbox"/>			
- Turn peripheral devices off when asset is parked for more than	0	:	15 : 0 (900 seconds)
After waking up, leave peripheral devices on for	0	:	15 : 0 (900 seconds)
Surfacing <input checked="" type="checkbox"/>			
- Switch peripheral devices on every	12	:	0 : 0 (43200 seconds)
- Limit number of times to surface <input checked="" type="checkbox"/>			
-- Only surface a maximum of	5	times	

NB! Do not use the power outputs when connecting critical or emergency type of inputs i.e. Panic or Tamper Switch – these type of inputs will require a permanent power source in the event of emergency that the events do in fact record.

20 Backup Battery Replacement Procedure



- Disposal of a battery into fire or a hot oven, or mechanically crushing or carrying of a battery, can result in an explosion
- *Ensure that the battery is replaced by an approved type, namely: UB2280 (3.7V; 300mAh) Lithium Polymer Battery.*
- *Leaving a battery in an extremely high temperature surrounding environment that can result in an explosion or the leakage of flammable liquid or gas*
- *A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas*
- *Keep out of reach of children*
- *Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2h of ingestion.*
- *In case of ingestion of a battery, seek medical assistance promptly.*
- *Only dispose of batteries responsibly at a recycling location.*
- *Do not throw battery in water.*

All units are shipped with the battery already plugged in. Should it be necessary to replace the battery, refer to the steps below for fitting the battery:

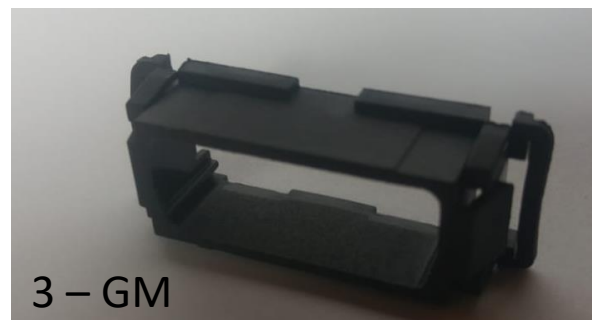
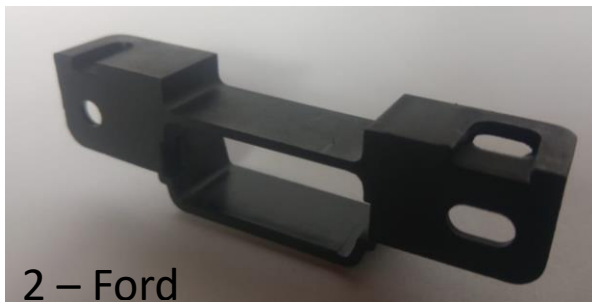
- 1) Unhook the clips and remove the cover.
- 2) Unplug the old battery and remove the battery by pulling it out.
- 3) Insert the replacement battery with the wire/connector end to the right.
- 4) Fully insert the battery (ⓘ *Take care not to damage the wire connection below the orange foil*).
- 5) Insert the battery connector into the socket on the PCB. Note, that it is a keyed connector. Ensure the battery connector is fully inserted.
- 6) Fold the battery wire lead in the open space to the right of the battery.
- 7) Clip the cover back on; ensure the hooks click into place.

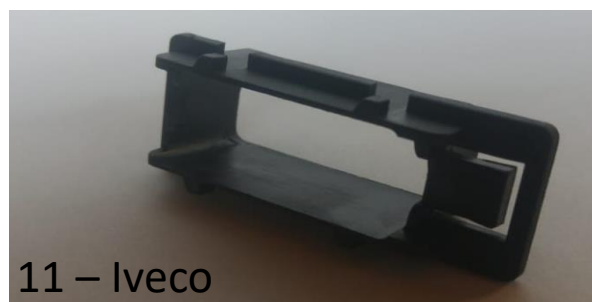
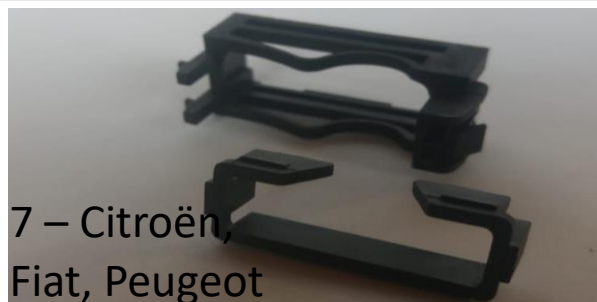
21 Glossary

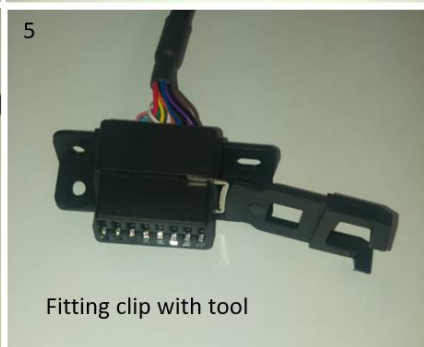
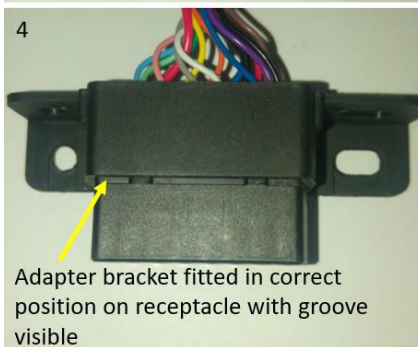
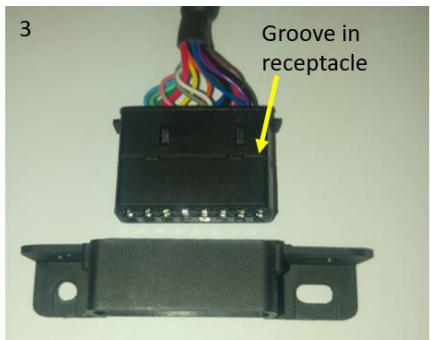
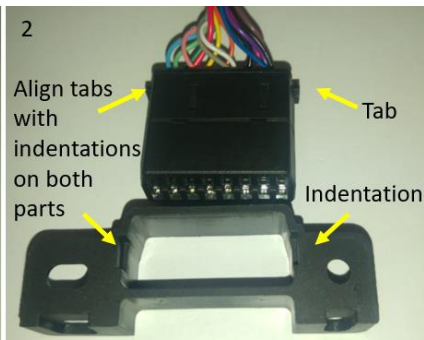
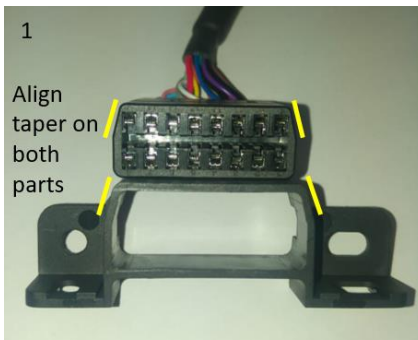
Abbreviation	Description
BT	Bluetooth
GPS	<u>G</u> lobal <u>P</u> ositioning <u>S</u> ystem
GSM	<u>G</u> lobal <u>S</u> ystem for <u>M</u> obile Communications
GND	Ground (0V)
RX	Receive
TX	Transmit
WiFi	Local Area Wireless Computer Network
BT	Bluetooth

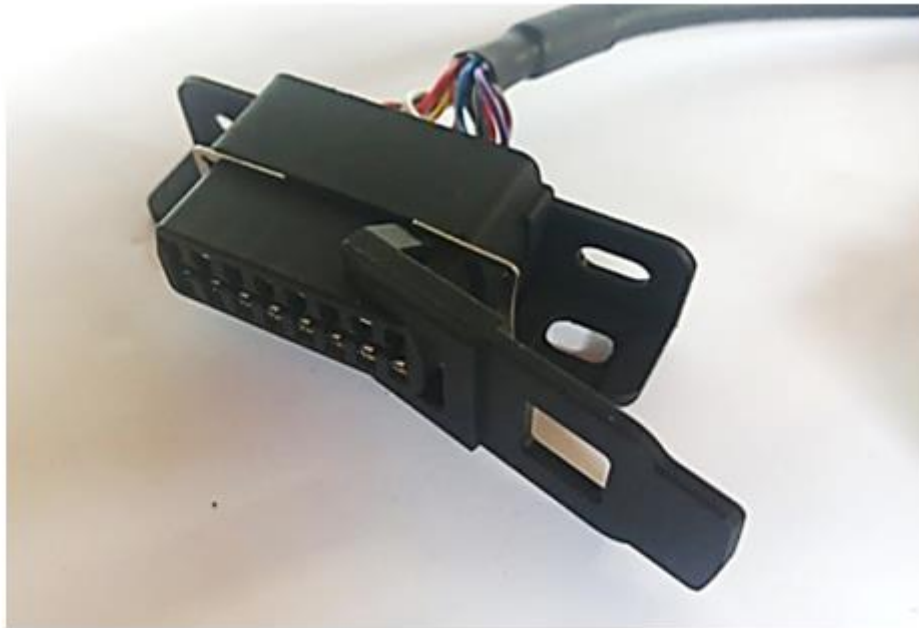
22 Appendix A: OBDII Quick Start Guide Pictures

Refer to the OBDII Harness P/N in section 3: A0061MT MiX 3000 Universal OBDII Plugin Harness for light vehicles. Below are pictures with guidance how to connect the supplied brackets. Select the bracket suitable for the vehicle.









Removing clips with the tool

