



# Installation manual

device model: X700

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# Table of contents

Document history	. 3
1. System components	. 4
2. Installation rules	. 5
3. Wiring rules	. 5
4. Standard system installation	. 7
5. Connecting to vehicle electrical harness	. 8
5.1. General electrical diagram for power supply and digital inputs/outputs	.8
5.2. Power supply and ignition circuits.	. 9
5.3. Vehicle immobilization.	. 9
5.4. Panic button and Door tamper circuits	10
5.5. Driver identification and temperature sensor	10
5.6. CANbus with FMS protocol	11
6. Check for correct functionality after installation	12
6.1. Powering the device and starting/stopping the vehicle	12
6.2. Check for vehicle power-up and ignition circuit	12
6.3. Check for GPS correct functionality	13
6.4. Check for correct functionality and installation of optional accessories	13



# **Document history**

Date	Number	Changes
2010.01.05	4.1	- initial release
2010.02.02	4.2	<ul> <li>added document history</li> <li>added pin numbers for all X700 signals into all images</li> <li>changed immobilization circuit in chapter 5.1 and 5.3 (relay plus form IGN)</li> <li>corrected "connected to GPRS service" for status LED in chapter 6.1</li> </ul>
2010.02.12	4.3	<ul> <li>- changed immobilization circuit in chapter 5.1 and 5.3 (relay plus from STARTER)</li> <li>- corrected PanicButton and DoorTamper colors in circuits from chapter 5.1 and 5.3</li> </ul>
2011.06.03	4.4	- added direct wire installation method



# 1. System components



Fig. 1 - Installation kit contens

#### Standard equipment contents

- 1. X700 device
- 2. external GSM antenna
- 3. vehicle connection harness
- 4. GPS antenna

#### **Optional accessories:**

- 5. driver identification button reader
- 6. temperature sensor
- 7. OneWire splitter
- 8. immobilization relay



# 2. Installation rules



Fig. 2 - Mechanical stress relief wire loop

- 1. System components shall be fixed by plastic collars so that they do not allow balance or separation due to vehicle vibration
- 2. Cables for connecting equipments will be mounted with loops to allow mechanical stress relief in wires and reduce mechanical stress on connectors
- 3. Equipments shall be installed in areas with enough space so as not to be damaged by mechanical constraints





Fig. 3 - GSM antenna damaged by wrong installation

#### Installation restrictions:

- DO NOT place near heat sources
- DO NOT place in areas with high humidity or risc of water infiltration
- DO NOT apply force that could damage the GSM and GPS antenna or other system componnents

## 3. Wiring rules



Fig. 4 - How to use the Tap Connector to electrically connect X700 wires to vehicle's electrical wiring

It is mandatory that X700 cables connection to vehicle's electrical wiring shall be done using tap connectors (1) included in the package. After correct identification of required signal wires to connect the X700 device, following steps shall be executed for each wire: place unstripped run wire from vehicle inside run channel. (2), insert unstripped tap wire from X700 completely (3), make the connection by crimping the u-contact down flush with the top of the plastic insulator (4), close top hinged cover until latched.

#### Installation restrictions:

- DO NOT cut existing wires of vehicle's electrical harness
- DO NOT use wires with smaller gauge than required by tap connectors

In case vehicle wires are not compatible with tap connectors (copper wire diameter > 1mm), the following wire installation method shall be used:

• remove 1cm of insulation from existing vehicle wire, without cutting the copper wires

- split copper strains to form an eye shape
- strip 3-5cm of insulation of X700 wire at wire end
- insert X700 wire inside vehicle wire eye opening

• twist X700 wire two times left and two times right around vehicle wire, and then remaining wire around the X700 wire itself

• isolate the connection and apply security seal

#### Installation restrictions:

 DO NOT cut existing wires of vehicle's electrical harness, just remove isolation



6

4

## 4. Standard system installation



Fig. 6 - In-vehicle installation example

The X700 device shall be installed hidden under the dashboard, near the electric fuse box area. As the device includes an internal or external GSM antenna, it shall be placed in an unshielded area, more than 20cm apart from metallic parts of the vehicle, so that the quality of the GSM signal shall not be affected.

#### Installation restrictions:

- DO NOT place where the air bags could deploy
- DO NOT place in areas with more than one metalic wall close to the device



Fig. 7 - GPS antenna installation example

The GPS antenna shall be installed under the front windshield, with **GPS** marking facing up, having direct sky view.

For higher discretion or to reduce chance of vandalism, the antenna shall be installed hidden under dashboard. Make sure it isn't covered by metallic parts that can affect the quality of the received GPS signal.

#### Installation restrictions:

- DO NOT place where it may block the driver's vision
- DO NOT place where the air bags could deploy



### 5. Connecting to vehicle electrical harness

The X700 device connects to vehicle's electrical harness via a wired 10 pin connector. Connector pinout and is detailed below:



Fig. 8 - X700 connector pinout (view to the device)

**IMPORTANT ! Battery+**, **Battery-** and **Ignition** signals are mandatory for the correct functionality of the system. Unused signals shall be left unconnected, shall not be cut, so it could be used later for implementation of extra features.

#### 5.1. General electrical diagram for power supply and digital inputs/outputs



Fig. 9 - Power supply and digital I/O circuit diagram

#### 5.2. Power supply and ignition circuits



Fig. 10 - Power supply and ignition circuit diagram

The X700 device shall be powered directly from the vehicle's battery, from a permanent plus, connected after a spare fuse in the fuse box. The Ignition signal shall be connected to IGN signal of the vehicle and must have positive potential all time the engine is running and zero voltage when the engine is off.

#### Installation restrictions:

DO NOT power the device from lighter's positive rail or any other power rail with zero voltage when the engine is off.



5.3. Vehicle immobilization

Fig. 11 - Vehicle immobilization circuit diagram

The immobilization relay is used for engine cutoff. To install it, cut the normal power supply circuit for the engine starter system (battery, fuse, ignition key, clutch/gearbox safety, starter relay) at the starter relay end and close the circuit with the immobilization relay's contacts (normal closed). In immobilization enabled state, the relay's contacts shall be opened and thus the power supply circuit for the starter will be open, disabling engine start-up.

#### Installation restrictions:

It is FORBIDDEN to modify the immobilization relay circuit in such a way that it may cut the engine when the vehicle is running or the engine is already started and running.

#### 5.4. Panic button and Door tamper circuits



Fig. 12 - PanicButton and DoorTamper circuit diagram

Both PanicButton and DoorTamper signals are active low, when connected to negative or zero potential (vehicle chassis or ground) and inactive when left open (unconnected). A NormalOpened pushbutton switch shall be used to connect the signal to ground.

Unused signals shall be left unconnected, not connected to ground.

#### 5.5. Driver identification and temperature sensor



Fig. 13 - Connection examples for iButton reader and temperature sensor

The temperature sensor or iButton reader may be connected to the X700 device via the OW plug, using the cable included in the package. The splitter shall be used to connect both equipments to the X700 device. The iButton reader shall be installed directly on the dashboard, such that is visible and easily accessible to the driver.

#### Installation instructions:

- DO NOT place where it may block the driver's vision



#### 5.6. CANbus with FMS protocol



Fig. 14 - FMS CANbus connection diagram

The X700 device can connect directly to vehicle's CANbus with FMS protocol and read information from dashboard equipment (mileage, fuel consumption,...). The FMS CANbus is separated from other CAN buses inside the vehicle that are responsible for communication between specific functional blocks. An **FMS GATEWAY** equipment is needed for conversion between the two CAN buses.

#### Installation restrictions:

DO NOT connect the X700 device directly to the non-FMS CAN bus of the vehicle, without the FMS Gateway.

The FMS-Gateway isn't installed by default for all vehicles or it needs to be activated by the manufacturer. There are differences for connection to the FMS CAN bus, that varies for each manufacturer. For detailed information related to CAN wires location and colors, for each vehicle model and type, use the "Specification for connection to FMS CANbus" document.

## 6. Check for correct functionality after installation

After connection in the vehicle and installation according to previous chapters, correct functionality must be tested for the new device.

#### 6.1. Powering the device and starting/stopping the vehicle



#### 6.2. Check for vehicle power-up and ignition circuit



The X700 device is powered correctly and the ignition key circuit is installed correctly if the start and stop points for the journey are the same with starting and stopping the vehicle engine from steps 3 and 5 above, and time is 5min according to step 4 above.

#### 6.3. Check for GPS correct functionality



✓ The GPS antenna is functional and correctly installed if the POI Stop location is same as real location of the vehicle (green arrow) at the stop of the journey

#### 6.4. Check for correct functionality and installation of optional accessories

For checking the correct functionality and installation of optional accessories or other installation details, please contact the technical support department at **support@safefleet.eu**