

# FMA110 CAN adapters

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## Purpose of CAN adapters LV-CAN200 and ALL-CAN300



LV-CAN200 is used to read data from light vehicles, while ALL-CAN300 is used to read data from any type of transport: light vehicles, trucks, buses, agriculture transport and other special transport. Using these adapters FMA110 device is able to collect and send vehicle data.

Parameter	Value
<b>Supply voltage</b>	+9..+50 V
<b>Power supply current</b>	Average 10 mA. Max (peak) 100 mA
<b>Working temperature</b>	-40..+85 °C
<b>Max working humidity</b>	60 % (non condensate).

## LV-CAN200 and ALL-CAN300 program number selection

LV-CAN200 or ALL-CAN300 must be set to program number which depends on the vehicle model. **Needed program number is always written on LV-CAN200 or ALL-CAN300 mounting scheme.** Please contact Teltonika sales manager to get the latest supported vehicle list and mounting scheme for your vehicle providing information about car manufacturer, model and year.

## LV-CAN200 and ALL-CAN300 program number configuration via SMS command

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LV-CAN200 and ALL-CAN300 program number can be set remotely, using SMS command, where X

is new program number value (more CAN commands can be found in section [SMS command list](#)):  
"lvcansetprog X"

## Selecting LV-CAN200 and ALL-CAN300 program number manually

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Steps to set program number:

- Hold SWITCH down until LED starts blinking.
- Release the SWITCH.
- Then LED starts blinking and counting first digit of program number (one blink means digit 1, two blinks mean digit 2 etc).
- To stop counter push SWITCH.
- Release the SWITCH, then LED starts blinking and counting second digit of program number.
- To stop counter push SWITCH.
- Release the SWITCH, then LED starts blinking and counting third digit on program number.
- To stop counter push SWITCH.
- Release SWITCH, if programming is successful LED will blink 10 times.

## SIMPLE-CAN - contactless CAN-BUS reader



SIMPLE-CAN is a contactless adapter used to read vehicle CAN data with LV-CAN200 or ALL-CAN300. If LV-CAN200 or ALL-CAN300 connection requires two CAN lines to get all data, then two SIMPLE-CAN readers are required.

### Technical details

- Power supply voltage +9..+63 V.
- Power supply current: standby 1.6 mA, active 8.3 mA @ 12 V; standby 0.91 mA, active 4.3 mA @ 24 V.
- CAN-BUS speeds from 33.33 to 500 kb/s.
- Automatically sets CAN Low, CAN High polarity.
- Automatically adjusts signal level and speed.

SIMPLE-CAN works in the **listening mode only**, so that not all the data available on the CAN-BUS may be received using this solution. **The device automatically sets CAN L/H polarity**, but the calibration has to be always performed during installation process. Connection of previously calibrated unit to another car needs new calibration because the reader **automatically adjusts signal level and speed** to different CAN buses. The device also **automatically adapts** to the found **noise level**.



When power supply is connected, the LED shines continuously. It means that device is waiting for calibration. **Calibration process** has to be carried out when CAN-BUS twisted pair is tightened on SIMPLE-CAN and when ignition is ON. Please press the switch briefly and wait for the LED to start blinking every second. Automatic calibration process takes up to 10 seconds depending on the

vehicle's model. Correct calibration process is confirmed by LED starting to blink every 2 seconds (when the CAN-BUS is active). When the CAN-BUS enters sleep mode, SIMPLE-CAN device also enters sleep mode and takes 1.6mA @ 12V. In the sleep mode LED does not shine. If after calibration process LED shines continuously, it means that device is not calibrated yet, CAN-BUS transmission has failed or ignition during calibration was not ON.

## Connecting FMA110 CAN adapters ALL-CAN300 and LV-CAN200

- Connect USB Plug to FMA110 device, connect Light Vehicles Can adapter to other end of the cable.
- Connect Light Vehicles Can adapter Pin 1 and Pin 2 to cars CAN bus. CAN interface location of the supported light vehicle is described on mounting scheme.
- Connect car power supply lines to Pin 3 positive, Pin 4 Negative.
- Pins 9,10 connection is optional it depends on exact car model.

\*For exact pinout see sticker on Light Vehicles Can adapter.



**ATTENTION! For detailed diagram of connection between adapter and light vehicle please contact Teltonika sales representative and provide information about car manufacturer, model and year.**

**ATTENTION! Do not swap CAN L and CAN H lines.**

**Do not swap power supply lines. Make sure that voltage does not exceed 30V. Power supply lines should be connected at the end of installation work.**

## FMA110 ALL-CAN300 and LV-CAN200 parameters configuration

FMA110 shares the same USB port for connecting LV-CAN200 or ALL-CAN300 adapter and configuring device with PC. FMA110 can be configured using "SCAN" function or "Offline Configuration" SCAN function - is in use when FMA110 is connected to CAN adapter, then wait 10s (Note, that car engine must be started), disconnect adapter from FMA110, and connect PC USB cable to FMA110 Device. It is very important not to disconnect FMA110 from power source during this operation, because if FMA110 is reconnected all received CAN bus data will be lost. FMA110 remembers received data from LV-CAN200 or ALL-CAN300 and at the end of the procedure when "SCAN" button is pressed, user will see all CAN data which is sent by adapter. Enable CAN data which needs send to server and save configuration pressing "Save" button.

To configure CAN data:

1. In car, connect LV-CAN200 or ALL-CAN300 to CAN bus and to the FMA110 device, wait 10 seconds. Note, that car engine must be started.
2. Disconnect LV-CAN200 or ALL-CAN300 from FMA110, and connect PC USB cable to FMA110 Device. It is very important not to disconnect FMA110 from power source, because then all CAN data will be lost.



CAN bus data which can be read from your car is shown in "Light or ALL Vehicles Can adapter

supported cars" document.

**Offline configuration** - user can select which CAN data will be read from LV-CAN200 or ALL-CAN300 and directly sent to server without connection to adapter. Please note that parameters depend on vehicle manufacturer and vehicle model. Please for further information check "Light and All Vehicles Can adapter supported cars" document.

There are two types of operations with CAN data elements:

- Monitoring of CAN bus data
- CAN bus data event capturing

Monitoring method is used when user wants to receive CAN data on regular basis, for example every 20 seconds.

Event functionality is used to store additional AVL packet when state of CAN element is changing. For example Speed changes, low fuel level, engine temperate, etc.

Send data to server field - allows enabling CAN element so it is added to the AVL data packet and sent to the server. By default, all CAN elements are disabled and FMA110 records only GPS data.



All information about I/O element parameters description is in section [I/O settings](#).

All LV-CAN200/ALL-CAN300 I/O parameters configuration settings are described in "FMA110 Protocols" document, except ALL-CAN300 bitmasks, which are described in the table below.

Property name	Size, bytes	Value bitmasks
Control state flags	4	Byte0 (LSB): 0x01 - STOP 0x02 - Oil pressure / level 0x04 - Coolant liquid temperature / level 0x08 - Handbrake system 0x20 - AIRBAG  Byte1: 0x01 - CHECK ENGINE 0x02 - Lights failure 0x04 - Low tire pressure 0x08 - Wear of brake pads 0x10 - Warning 0x20 - ABS 0x40 - Low Fuel  Byte2: 0x01 - ESP 0x02 - Glow plug indicator 0x04 - FAP 0x08 - Electronics pressure control 0x10 - Parking lights 0x20 - Dipped headlights 0x40 - Full beam headlights  Byte3: 0x40 - Passenger's seat belt 0x80 - Driver's seat belt

**Agricultural  
machinery flags**

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Byte0 (LSB):

- 0x01 - Mowing
- 0x02 - Grain release from hopper
- 0x04 - First front hydraulic turned on
- 0x08 - Rear Power Take-Off turned on

Byte1:

- 0x01 - Excessive play under the threshing drum
- 0x02 - Grain tank is open
- 0x04 - 100% of Grain tank
- 0x08 - 70% of Grain tank
- 0x10 - Drain filter in hydraulic system of drive cylinders is plugged
- 0x20 - Pressure filter of drive cylinders hydraulic system is plugged
- 0x40 - Alarm oil level in oil tank
- 0x80 - Pressure filter of brakes hydraulic system is plugged

Byte2:

- 0x01 - Oil filter of engine is plugged
- 0x02 - Fuel filter is plugged
- 0x04 - Air filter is plugged
- 0x08 - Alarm oil temperature in hydraulic system of chassis
- 0x10 - Alarm oil temperature in hydraulic system of drive cylinders
- 0x20 - Alarm oil pressure in engine
- 0x40 - Alarm coolant level
- 0x80 - Overflow chamber of hydraulic unit

Byte3:

- 0x01 - Unloader drive is ON. Unloading tube pivot is in idle position
- 0x02 - No operator!
- 0x04 - Straw walker is plugged
- 0x08 - Water in fuel
- 0x10 - Cleaning fan RPM
- 0x20 - Trashing drum RPM

Byte4:

- 0x02 - Low water level in the tank
- 0x04 - First rear hydraulic turned on
- 0x08 - Standalone engine working
- 0x10 - Right joystick moved right
- 0x20 - Right joystick moved left
- 0x40 - Right joystick moved front
- 0x80 - Right joystick moved back

Byte5:

- 0x01 - Brushes turned on
- 0x02 - Water supply turned on
- 0x04 - Vacuum cleaner
- 0x08 - Unloading from the hopper
- 0x10 - High Pressure washer (Karcher)
- 0x20 - Salt (sand) disperser ON
- 0x40 - Low salt (sand) level

Byte6:

- 0x01 - Second front hydraulic turned on
- 0x02 - Third front hydraulic turned on
- 0x04 - Fourth front hydraulic turned on
- 0x08 - Second rear hydraulic turned on
- 0x10 - Third rear hydraulic turned on
- 0x20 - Fourth rear hydraulic turned on
- 0x40 - Front three-point Hitch turned on
- 0x80 - Rear three-point Hitch turned on

Byte7:

- 0x01 - Left joystick moved right
- 0x02 - Left joystick moved left
- 0x04 - Left joystick moved front
- 0x08 - Left joystick moved back
- 0x10 - Front Power Take-Off turned on

<b>Security state flags</b>	8	<p>Byte0 (LSB):</p> <ul style="list-style-type: none"> <li>0x20 - Bit appears when any operate button in car was put</li> <li>0x40 - Bit appears when immobiliser is in service mode</li> <li>0x80 - Immobiliser, bit appears during introduction of a programmed sequence of keys in the car</li> </ul> <p>Byte1:</p> <ul style="list-style-type: none"> <li>0x01 - the key is in ignition lock</li> <li>0x02 - Ignition on</li> <li>0x04 - Dynamic ignition on</li> <li>0x08 - Webasto</li> <li>0x20 - Car closed by factory's remote control</li> <li>0x40 - Factory-installed alarm system is actuated (is in panic mode)</li> <li>0x80 - Factory-installed alarm system is emulated by module</li> </ul> <p>Byte2:</p> <ul style="list-style-type: none"> <li>0x01 - Parking activated (automatic gearbox)</li> <li>0x10 - Handbrake is actuated (information available only with ignition on)</li> <li>0x20 - Footbrake is actuated (information available only with ignition on)</li> <li>0x40 - Engine is working (information available only when the ignition on)</li> <li>0x80 - Reverse is on</li> </ul> <p>Byte3:</p> <ul style="list-style-type: none"> <li>0x01 - Front left door opened</li> <li>0x02 - Front right door opened</li> <li>0x04 - Rear left door opened</li> <li>0x08 - Rear right door opened</li> <li>0x10 - Engine cover opened</li> <li>0x20 - Trunk door opened</li> </ul> <p>Byte4:</p> <ul style="list-style-type: none"> <li>0x01 - Car was closed by the factory's remote control</li> <li>0x02 - Car was opened by the factory's remote control</li> <li>0x03? - Trunk cover was opened by the factory's remote control</li> <li>0x04 - Module has sent a rearming signal</li> <li>0x05? - Car was closed three times by the factory's remote control</li> <li>- High nibble (mask 0xF0 bit)</li> <li>0x80 - CAN module goes to sleep mode</li> </ul>
<b>Tachograph driver card presence</b>	1	<ul style="list-style-type: none"> <li>0x00 - No driver card</li> <li>0x01 - Driver1 card presence</li> <li>0x02 - Driver2 card presence</li> <li>0x03 - Driver1 and driver2 cards present</li> </ul>
<b>Driver 1 states</b>	1	<ul style="list-style-type: none"> <li>0xX0 - Break/rest</li> <li>0xX1 - Availability</li> <li>0xX2 - Work</li> <li>0xX3 - Driving</li> <li>0x0X - No time-related warning detected</li> <li>0x1X - Limit #1: 15 min before 4 1/2 h</li> </ul>
<b>Driver 2 states</b>	1	<ul style="list-style-type: none"> <li>0x2X - Limit #2: 4 1/2 h reached (continuous driving time exceeded)</li> <li>0x3X - Limit #3: 15 minutes before optional warning 1</li> <li>0x4X - Limit #4: optional warning 1 reached</li> <li>0x5X - Limit #5: 15 min before optional warning</li> <li>0x6X - Limit #6: optional warning 2 reached</li> </ul>

## Send data with 0, if ignition is off

Depending on LV-CAN200/ALL-CAN300 I/O parameters and ignition status, FMA110 can send locked (last known) LV-CAN200/ALL-CAN300 I/O and active (real time) parameters values or reset values to 0. When ignition is off, LV-CAN200/ALL-CAN300 I/O parameters values sent to server are:

<b>LV-CAN200/ALL-CAN300 I/O element</b>	<b>Status</b>
<b>Vehicle Speed</b>	reset
<b>Accelerator pedal position</b>	reset
<b>Total fuel used</b>	lock
<b>Fuel level (liters)</b>	lock
<b>Engine RPM</b>	reset
<b>Total mileage</b>	lock
<b>Fuel level (%)</b>	lock
<b>Program number</b>	lock
<b>Module ID</b>	lock
<b>Engine Work Time</b>	lock
<b>Engine Work Time (counted)</b>	lock
<b>Total Mileage (counted)</b>	lock
<b>Fuel Consumed (counted)</b>	lock
<b>Fuel Rate</b>	reset
<b>Program number</b>	lock
<b>AdBlue Level (%)</b>	lock
<b>AdBlue Level (liters)</b>	lock
<b>Engine Load</b>	reset
<b>Engine Temperature</b>	active
<b>Axle 1 Load</b>	lock
<b>Axle 2 Load</b>	lock
<b>Axle 3 Load</b>	lock
<b>Axle 4 Load</b>	lock
<b>Axle 5 Load</b>	lock
<b>Control State Flags</b>	active
<b>Agricultural Machinery Flags</b>	active
<b>Harvesting Time</b>	lock
<b>Area of Harvest</b>	reset
<b>Mowing Efficiency</b>	active
<b>Grain Mown Volume</b>	active
<b>Grain Moisture</b>	active
<b>Harvesting Drum RPM</b>	reset
<b>Gap Under Harvesting Drum</b>	active
<b>Security State Flags</b>	active
<b>Tachograph Total Vehicle Distance</b>	lock
<b>Trip Distance</b>	reset
<b>Tachograph Vehicle Speed</b>	reset
<b>Tachograph Driver Card Presence</b>	active
<b>Driver1 States</b>	active
<b>Driver2 States</b>	active
<b>Driver1 Continuous Driving Time</b>	active
<b>Driver2 Continuous Driving Time</b>	active
<b>Driver1 Cumulative Break Time</b>	active

<b>Driver2 Cumulative Break Time</b>	active
<b>Driver1 Selected Activity Duration</b>	active
<b>Driver2 Selected Activity Duration</b>	active
<b>Driver1 Cumulative Driving Time</b>	active
<b>Driver2 Cumulative Driving Time</b>	active

## **LV-CAN200/ALL-CAN300 Important Information**

### **Program Number logic change**

Due to the growing number of supported cars, program numbers have exceeded "999". In order to maintain one number format, we are moving from 3-digit to 4-digit program numbers.

In new LV-CAN200/ALL-CAN300 firmware (from 2017-09-01) all program numbers that were up to 999 are changed to start from 1000. So that further program numbers would continue the counting with 4-digit numbers.

However, all existing program numbers stay the same, but "1" is added to the front. Device still understands the entered 3-digit program number (via SMS/GPRS), it will automatically add "1" before it. If you enter "247" - device number will turn into "1247". In Bootloader only 4-digit format is available, just add "1" to the front of the needed program number.

### **Example**

When using older connection schemes where program number displayed as 3-digit program number:



Using LV-CAN200/ALL-CAN300 Bootloader from soft version 2017-09-27 it is necessary to add "1" to the front of program number:

