

Installation guide for telematic unit

VETRONICS 770



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1. INTRODUCTION

Telematic unit Vetronics 770 is an electronic device designed for fixed installation into vehicles. It is attached to the vehicle's power, external GPS antenna and optionally vehicle's CAN bus. The unit is designed for use in cars, trucks and commercial vehicles, with standard 12V or 24V power system. This manual provides information necessary for the installation of mobile units in vehicles.

The installation of the mobile units should be done by trained personnel, preferably by an authorized automotive service. It is possible to book a mounting training at the Princip company.

Warning: Vetronics 770 is not fully backwards compatible with older generations of the telematic unit from Princip. If you are replacing an older unit for Vetronics 770, you need to check the original cable harness very carefully. See chapter 3.7.

2. SAFETY INSTRUCTIONS

In order to prevent fire, electric shock, injury to the user or other people and damage to the telematic unit or vehicle, please obey following safety precautions:

- Never place the unit in locations where it is likely to cover the driver's field of vision, or where unit can cause injury to the driver, accident or where it can affect driving.
- Do not place the unit in an area outside the cabin of the vehicle (e.g. In the engine compartment) where the temperature range, vibration, humidity or dust can exceeds permitted levels.
- When fitting, ensure that the power supply meets the requirements of the manufacturer (12V-24V) and / or standards for on-board network for motor vehicles according to ECE. Observe the polarity of the supply voltage. Power wires must be connected through a fuse (max. 3A) to avoid short-circuit.
- Warranty does not apply to cases when a power supply does not meet the requirements of the manufacturer or the unit is connected reversing the polarity of the power supply.
- During installation, make sure to avoid accidentally touching the wires not connected to ground, live parts of the power system or any part of the electric vehicle. Such accident can cause not only destruction of the mobile unit, but also damage to the vehicle's systems. Manufacturer bears no responsibility for such damages.
- Installation must not interfere with other systems of the car (alarm, radio, airbags, tachograph etc.) e.g. electromagnetic radiation of GSM transmission or mechanical damage wires.
- We recommend to disconnect the car battery from the electrical system that before installation (especially when connecting the CAN bus).
- The unit is not user serviceable. In case of malfunction contact the service centre. Warranty doesn't cover any unauthorized intervention.
- The unit is intended for firm installation in a vehicle. Frequent reinstallation may cause damage to the unit and wear antenna connector. Thus caused damage is not subject to manufacturer's warranty.
- When choosing the location of the unit, make sure that the surface, on which it consolidates, is strong enough with regard to the weight of the unit. When choosing the location of the unit is also important to take into account the length of the GPS antenna lead.
- GPS Antenna lead (3m) may be extended, but it may have an adverse effect on signal quality. Do not extend the antenna lead unofficial extension cords. If necessary, use an antenna with longer cable (5m).

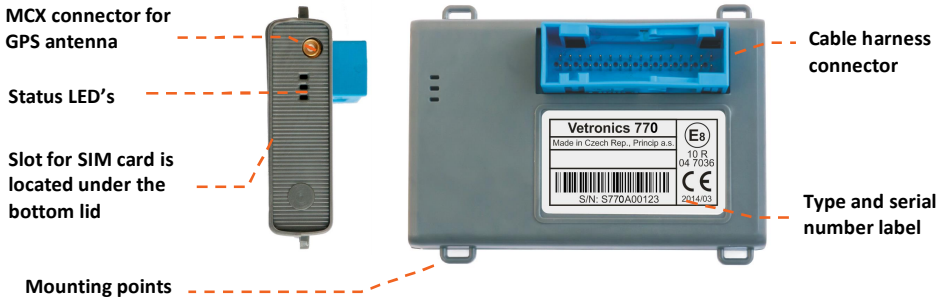
3. UNIT MOUNTING

The unit can be fastened by tightening straps using four mounting points on the unit. A solid "velcro" or double-sided adhesive tape can be also used to secure the unit. Before bonding, it is important to clean the contact surfaces from dust, grease, water and other dirt.

Warning: Due to the nature of some unit functions (eg. Driver's Style Rating), it is essential that the unit is installed in the vehicle firmly.

3.1. Description of basic parts

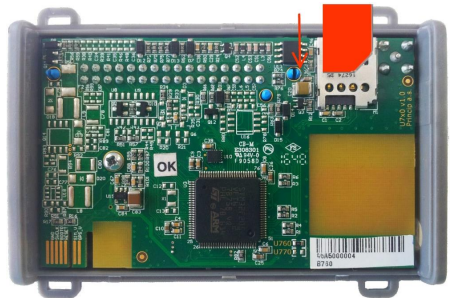
The following figure shows the unit from the side and from the top.



3.2. micro SIM card (3FF)

For the proper function of the GSM module in the unit, it is necessary that the inserted micro SIM card has a deactivated PIN. You can do this on your mobile phone before inserting a micro SIM card into the unit.

Open the rear plastic cover of the unit and insert the micro SIM card into the holder as shown in the illustration. SIM card contacts must point to the drive. The contact pads on the SIM card and on the SIM card holder in the unit must be clean. The correct orientation of the SIM card defines the cut corner of the card.



Warning: Insert the micro SIM card when the unit is powered off.

3.3. Seal

The rear plastic cover of the unit can be sealed with a special self-adhesive seal depending on the agreement with customer. The purpose is to avoid any unauthorized interference with the unit.

3.4. Connecting of the cable harness

The power supply must be connected to the three power points:

Clamp „31“ – Brown wire to the vehicle ground.

Clamp „30“ – The red wire to the supply voltage before the key (supply voltage is permanently present) in the range of 12-24V via fuse 2A.

Clamp „15“ – Black-gray wire to the supply voltage behind the key (supply voltage is present only when the switch box is on) in the range of 12-24V via fuse 2A.

3.5. Connecting to the 24V power system

Vetronics units can also be mounted on trucks and vehicles with 24V supply. In this case, certain demands are placed on the quality of the onboard power network to which the unit is connected. There are a number of specific problems for vehicles, such as the use of disconnectors in both the positive and negative branches, various high-interference devices, the use of welding kits and starter carts. Unfortunately, the condition of the on-board network is often underestimated.

In cases of obvious damage to the unit by overvoltage or discharge, the guarantee cannot be accepted.

3.6. Connecting a vehicle with 24V supply with disconnector and 12V branch

If the vehicle is equipped with a battery disconnector or with a 12V branch, consult an appropriate connection with the mobile unit manufacturer.

Warning: In case of improper installation the unit or the vehicle may be damaged.

3.7. Connecting and checking VW AMP connector

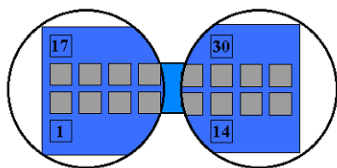


The standard cable harness is supplied with 30 wires and is 1m long with the VW AMP connector ending. It provides mobile unit connection to power supply from the vehicle's on-board network and the connection of other peripherals. The length of the cable can be adjusted for installation. Unused wires must be insulated. In any case, do not insert the VW AMP connector into the unit before checking the power connection.

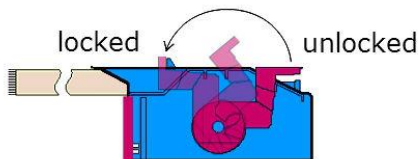
To check the connections, turn on the key and check the presence of voltage on all VW AMP pins with a voltmeter.

After checking, set the connector lock to "unlocked" position and plug the connector into the mobile unit with the harness pointing towards the antenna connector. Finally, switch the lock to "locked" position. The locked connector can be sealed with wire loop through sealing eyes or with a sticker.

AMP connector pin numbering (contacts point of view)



Locking system of AMP connector



3.8. Table of signals and wire colors

číslo pinu na konektoru AMP	signál	zkratka signálu	barva vodiče	doplňková barva vodiče
1	Power supply "KL30"	PWR_IN	red	
2	Power supply for external devices, adjustable 3.3V / 5V	PWR_ADJ	red	yellow
3	Ground "KL31"	GND		brown
4	Ground "KL31"	GND	brown	white
5	Analog input 1 (controlled pull-up)	IN1		white
6	Analog input 2 (controlled pull-up)	IN2	white	brown
7	Analog input 3 (controlled pull-up)	IN3	white	yellow
8	Analog input 4 (controlled pull-up)	IN4	white	blue
9	Wiegand D1 / USL input	WIE / USL_IN	violet	blue
10	Analog output 4 / Analog input 10	OUT4/IN10	green	white
11	Digital input (wake up function)	IN5	violet	red
12	Ignition input "KL15"	IGN	black	grey
13	Dallas input / Wiegand D0	DALLAS1	violet	green
14	Power supply for private/business switch LED	LED_S	red	white
15	Service RS232 RX	RS1	blue	brown
16	Service RS232 TX	RSO1	blue	grey
17	Power supply for Dallas chip reader LED (anode)	LED_D	red	green
18	Analog output 1 / Analog input 7	OUT1/IN7		green
19	Analog output 2 / Analog input 8	OUT2/IN8	green	yellow
20	Analog output 3 / Analog input 9	OUT3/IN9	green	grey
21	Backup battery +	BATT	red	blue
22	Universal bus input	UAR	violet	white
23	Backup battery +	BATT_MINUS	grey	yellow
24	Ground "KL31"	GND	brown	green
25	RS232 TX (trm)	RSO2	blue	white
26	RS232 RX (trm)	RSI2	blue	green
27	USL output	USL_OUT		-
28	-	-		-
29	CAN bus c1 (low)	CAN1_L	orange	brown
30	CAN bus c1 (high)	CAN1_H	orange	green
31	CAN bus c0 (low)	CAN0_L	orange	brown
32	CAN bus c0 (high)	CAN0_H	orange	black

Warning: The older version of connecting cables may vary. If your harness contains a different colour scheme or a different number of wires, or if you need to use the optional signals that are not available at wiring harness, contact the manufacturer.

Incorrect connection may result in injury or damage for which the manufacturer is not liable!

4. Placing antennas in the vehicle

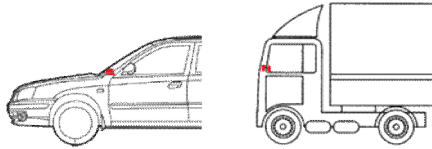
The unit contains internal GSM antenna and external GPS antenna. If there is insufficient reception of GSM signal after installation try to change the location of the unit. Do not place the unit in a closed metal compartment.

The GPS antenna is designed for hidden mounting in the vehicle cabin. Place the antenna so that the signal can be received from the largest part of the sky. The antenna should lie horizontally, with the bulging part of the plastic cover facing upright with a direct view to the sky. In practice, this cannot usually be ensured, and therefore a compromise solution is often chosen. The antenna may be placed on or below the dashboard as close as possible to the windscreen, near the longitudinal axis of the car, as shown on the picture. The lower part of the antenna is provided with a magnet for mounting on the metal parts of the vehicle. A velcro or double-sided sticker can be used for fastening the antenna. The antenna is waterproof, but not intended for mounting outside the vehicle.

The metal bottom of the antenna is conductively connected to the ground of the unit. If the antenna touches the metal parts of the vehicle body with a grounded negative pole, then the unit must not be plugged in before the disconnecter on the negative pole!

GPS and GSM signals penetrate glass, plastics and other non-conductive materials. The GPS antenna must not be covered with conductive material in the direction of reception of the signal.

Warning: Some vehicles have metal-plated windscreen. These glasses do not allow electromagnetic wave propagation. In these cases, use a roof antenna or consult the location of the antenna with the manufacturer. There are areas without the metallization in some metalized windscreens which can be used for antennas.

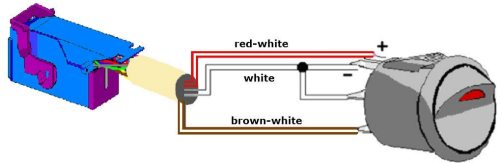


5. Installation of optional peripherals

5.1. Business/private journey switch

User can use this switch to select the journey type. If the LED lights up, it is a private journey.

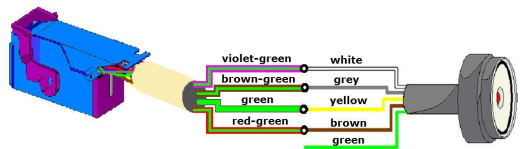
pin	harness	signal	switch
14	red-white	power	LED anode
5	white	input IN1	LED cathode, switch
4	brown-white	ground	switch



5.2. DALLAS chip reader (driver identification)

Dallas chip reader is used to identify the driver in the vehicle. When the unit is activated the LED in the center of the sensor is permanently lit. The driver is identified by attaching the Dallas chip to the reader. The unit records the chip code and the sensor light goes out. Logging out can be done by reattaching the same chip or turning off the ignition. The sensor has five wires but only four are used. Usually, select the red light and therefore connect the brown sensor wire. For green light connect the green wire. Some sensors from other manufacturers may have different color marking on the wires

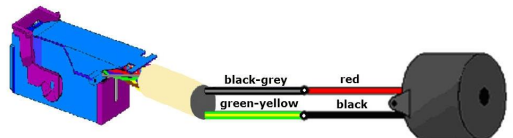
pin	harness	reader	signal
13	violet-green	white	DATA
24	brown-green	grey	GND
18	green	yellow	OUT1, LED cathode
17	red-green	brown	red LED anode
-	-	green	green LED anode



5.3. Buzzer (driver identification)

Acoustic signal for Dallas chip reader. When the unit is activated, the buzzer start to beep for reminding the driver to use the Dallas chip for identification. The beep signal continues until the chip is attached to the reader.

pin	harness	buzzer	signal
12	black-grey	red	IGN
19	green-yellow	black	output OUT2



5.4. RFID readers (driver identification)

Vetronics unit supports variety of RFID readers with several types of communication interfaces including RS232, UART, Dallas and Wiegand.

ARD2 reader with Dallas communication			
pin	harness	unit	reader
12	black-grey	IGN	power
12	black-grey	IGN	reader enable
13	violet-green	Dallas	data
24	brown-green	GND	GND
18	green	OUT1	LED cathode
19	green-yellow	OUT2	buzzer

HID reader with Wiegand communication			
pin	harness	unit	reader
12	black-grey	IGN	power
9	violet-blue	D1	data 1
13	violet-green	D0	data 0
24	brown-green	GND	GND
18	green	OUT1	LED cathode
19	green-yellow	OUT2	buzzer

There are a large number of wireless RFID readers on the market. If you need to connect another type of sensor, contact the manufacturer. If the reader is hidden beneath the dashboard, you can lead the LED on the dashboard. The external LED should be connected so that the cathode is connected to green and the anode to the red-green (or red-white) wire.

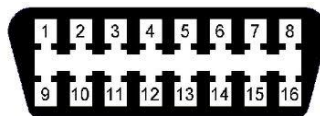
5.5. Other peripherals

The specific connection of optional peripherals, e.g. analogue inputs, tachograph, Dallas sensors, fuel gauges etc. must be consulted with the manufacturer of the unit

6. Connection to the OBDII service connector

The unit can be connected to the CAN bus in private car via OBDII connector. Then, the unit can read important data (mileage status, fuel level, diagnostic trouble codes...) directly from CAN bus.

OBDII connector with CAN bus is mandatory for vehicles in European Union since 2000 for gasoline, respectively since 2003 for diesel vehicles. Standard 16-pin socket must be placed in a location accessible to the driver no more than 50 cm from the steering wheel. Unit must be configured for specific vehicle manufacturer and type in order to read this data.



16 pole OBDII socket, driver's point of view

6.1. Wiring

AMP connector				OBDII connector	
signal	pin	harness	connection	OBDII	signal
CAN-L	31	orange-brown	OBD basic	14	CAN-L
CAN-H	32	orange-black	OBD basic	6	CAN-H
UIN	1	red	optional	16	vehicle power ("KL30")
GND	3	brown	optional	4 or 5	ground ("KL31")

6.2. Connection description

Connect the twisted pair of wires in harness to the OBDII diagnostic connector according to the table above, ie. orange-brown wire to the OBDII connector pin No. 14 and the orange-black wire to pin 6 of the OBDII connector. The OBDII connector itself must remain free for connection of diagnostic tools.

On the OBDII connector there is also a permanent on-board voltage ("KL30") on contact 16 and a ground ("KL31") on contact number 4. These can be used to power the unit. Therefore, the part of the standard unit connection can be made directly on the OBDII connector.

In the vehicles, where the unit cannot be connected to the OBD connector for various reasons is possible to connect the unit to another CAN bus or use DLC for older FORD vehicles. Such involvement should be consulted with the manufacturer.

7. Checking and diagnostics of mobile unit

All mobile units manufactured by Princip are double checked before delivery to the customer. It is very unlikely that new unit is malfunctional. Follow these instructions if the unit does not operate properly.

7.1. Check connections of basic signals

Ensure that the correct voltage values are present on the connector and that the wires are properly grounded. All voltages are measured against the vehicle's ground point.

- At least one of pins No. 3, 4 or 24 must be connected to the ground,
- if the ignition is turned off, the on-board voltage must be presented on pin No. 1 only,
- if the ignition is turned on, the on-board voltage must be presented on pin No. 1 and 12.

If the wiring is not correct, fix the wiring and check again. After that, plug the connector into the unit and verify that the AMP connector is properly inserted in the socket and the lock is securely closed.

Note: If all the signals are correctly connected but the unit still does not indicate the activity by red LED, contact the manufacturer.

7.2. Verifying basic functions with diagnostic LEDs

Diagnostic LEDs are used to verify the basic functions of the unit. Each of the three LEDs (green, orange, red) can either light, blink or remain off. Meanings of the LED states are described in the table below. Follow this procedure:

- Place the vehicle outside garage, so that GPS signals can be received from satellites.
- Turn the ignition key on to activate the unit.
- Check the three indication LEDs on the unit.
- The status can change. The final status is reached in max. 2 minutes.

Each of the three LEDs (green, orange, red) can either be lit, flash or remain off. The status of each LED is

Diagnostic LED status				
color	function	off	flash	on
green	GSM	not logged to the operator (SIM error or low GSM signal)	Logged to the operator, no GPRS connection	GPRS connection
orange	GPS	no GPS signal	received signal from at least one satellite	3D position
red	other	ignition not detected	ignition detected, no CAN messages receiving	ignition detected, receiving CAN messages

described in the table below.

The red LED can also blink for a few seconds after the ignition is switched off.

7.3. Checking Business/Private switch

With the ignition key turned on and switched to the "private journey" position, the built-in LED on the switch lights on. If the LED does not light up, check the wiring of the switch. In the "private journey" position, there must be a zero voltage on the brown-white and white wires and the voltage 1 - 2.5 V must be on the contact marked "+". When switching to the "business journey" position, the white wire must have a voltage greater than 5 V And "+" contact approx. 4 V.

7.4. Checking Dallas chip/RFID reader

There are several variants of the chip readers. It is necessary to select the proper variant and to connect the reader according to the table in the Chapter 5. After the ignition key is switched on, the red light in the center of the reader lights up and after a few seconds a beeping starts. By attaching the identification chip, the LED goes off and the beeping stops.

If the indicator light does not light up when the power is turned on, verify that the voltage on the red-green wire is about 3.8 V. Check the LED in the sensor by connecting the green wire and cathode diode to the ground for a moment. The functional LED should light up. When the LED does not go out after the chip is attached, check the reader connection.

The RFID reader works in terms of LED and audio signals in the same way as Dallas chip reader.

Note: The Dallas chip reader or RFID reader is activated based on customer requirements when ordering. If the sensor does not work, even if the wiring is correct, the unit may be defective. Contact your supplier if necessary.

7.5. Checking unit systems via web interface

You can easily diagnose the drive through the web interface, which can be found at <http://diag.princip.cz>

7.6. Checking unit systems using diagnostic SMS

Diagnostic SMS checking is used to verify the basic functions after mounting the unit. The check can be made according to the following procedure:

- From the mobile phone, send an SMS to the phone number of the unit with the letter "S" or "s" (status).
- For SMS card units with 89882390000xxxxxxx ICCID form, you can send an SMS in the form Axxxxxxx, where xxxxxxxx is the ICCID ending number on the SIM card or the SMS containing SN of the unit in the form S7xxAxxxxx, on the phone number +420602229317. E.g. For ICCID 8988239000001234567 the SMS is: A1234567

If the unit does not respond, it is necessary to check the GSM system. The response format for the diagnostic message is as follows:

OK/ERR/OFF GPS=ss u=x A=a engprs=g alive=tt aux=app(t) trm=app(t) SN=nnnnnnn HW=h.hh FW=f.f.f ccc

Individual groups of SMS information mean:

OK/ERR/OFF

It is assumed that for testing the GPS function you must wake up the unit by turning on the ignition key. Therefore, the first item is whether the unit detects a voltage signal behind the key and whether it has any information from GPS.

value	meaning
OK	ignition is detected, GPS module has enough signal from satellites
ERR	ignition is detected, GPS module has not determined the position yet
OFF	ignition is not detected

GPS

Item "GPS=xxx", where xxx is a number of receiving GPS satellites. Signal from at least four satellites is sufficient for the satisfactory operation. There are usually 8-12 satellites in place with good views of the sky. The low number of signals in such a location may be related to the improper installation of the GPS antenna.

u

Item "u=x" indicates the presence of the UIN1 main power supply and the UIN2 "voltage behind the key" signal according to the table:

value	UIN1	UIN2
u=0	off	off
u=1	on	off
u=2	off	on
u=3	on	on

A

Item "A=a" indicates the status of the business/private switch. It can only have two values, either "A = 0" (private journey) or "A = 3" (business journey).

engprs

If "engprs = g" has a value "engprs = 1", it indicates that the GPRS feature is enabled in the configuration (but does not say anything about whether the APN is set or whether the service is enabled by the SIM card). "engprs = 0" means that GPRS configuration is disabled.

alive

Item "alive=tt" shows the set time from switching off the ignition until the unit starts sleeping (transition to low-power mode). The time interval can be expressed in minutes (eg. "alive = 30m") or hours (eg. "alive = 8h"), "alive = none" means prohibited sleeping.

aux

Item "aux=app" indicates the function (application) setting on the service line. An item is listed only when this function is set. If the correct activity on this line is detected, the brackets are expanded, indicating the time of this activity in seconds, minutes or hours (eg. (5s), (99m), (24h)). If activity has not been detected (from restart or within 99 hours), "(-)" is displayed. The activity means detecting of data on the line. In case of formatted data, the format and the checksum of the received message are also checked. For some features the activity is not checked.

trm

Item "trm=app" indicates same information as "aux=app" just for terminal line.

id

Item "id=src(t)" contains information about the driver's log-in source with the most recent login information.

SN, HW a FW

These items indicate the following unit information:

"SN=nnnnnnnnnn" – serial number of the unit

"HW=h.hh" – hardware type of the unit

"FW=f.f.f" – firmware version of the unit

fms/obd/vwm/off

This items indicate CAN bus mode settings and examples of recognized information from this bus. The first two parameters separated by the "/" character include the type of the bus or the application that is set in the configuration. Behind this item, the information you see is different by the settings. There may be information about mileage, tank fuel, mileage and time for service, etc.

7.7. What to do if the fault failed to remove?

If you have done all of the previous checks and the unit is still not fully functional, try to connect another unit that you know it works. If this unit does not communicate it will probably be a connection error and try repeating the tests. If the reference unit is fully functional there is no error in the connection but in the checked unit. Do not open or perform any other interference with the internal system in any way. There are no components in the unit that could be repaired without other specific tools so send it to the vendor for complaint procedure. The product waives all warranties if it has been mechanically damaged or the warranty seal has been violated.

Before sending the unit to repair you can use the telephone consultation with the technician from the service department. In many cases a malfunction can be removed remotely without the need to send the unit. Our service department is able to remotely diagnose and reconfigure or change the firmware.

7.8. Quality

We pay great attention to the quality of production. Each unit undergoes many tests in production and the results are recorded. The final inspection is performed prior to distribution. However, the unit may not function after mounting. Usually, there is a problem with the installation of the unit. However, the supplied unit may not work. These cases are addressed responsibly, and due to ISO quality management, each case is evaluated and serves to improve individual processes for the future. Thank you for your possible comments.

We wish you many mileage with our product.



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