

# PEUGEOT METROPOLIS 400

(2013-2020)

**SMART KEY**

For ASW-NEXT

Short User Manual

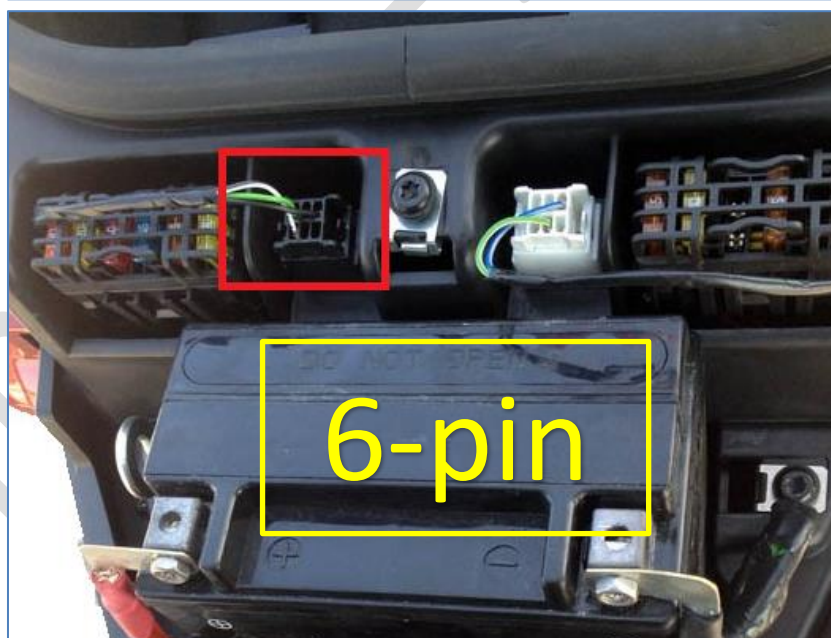
*Immo*

*Tools. It*

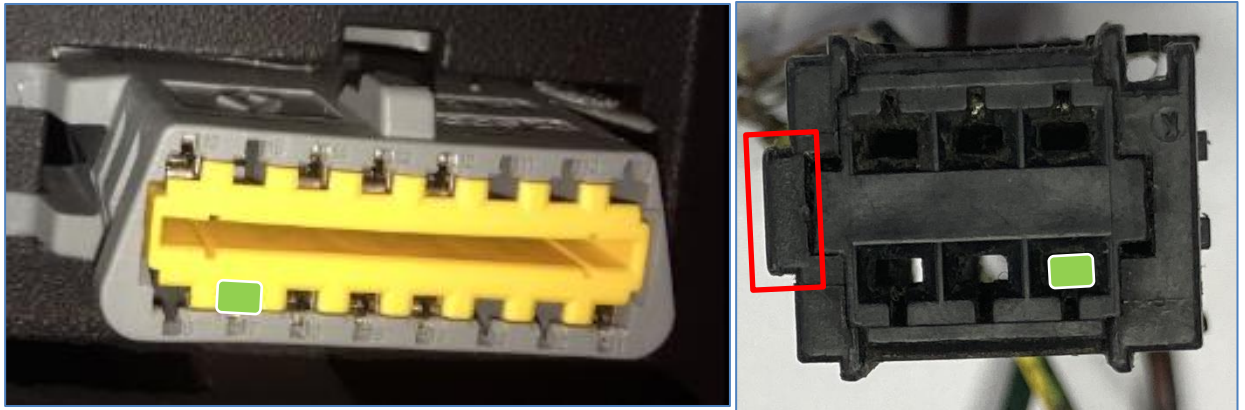
October 2023

## 1. How to connect ASW-NEXT in the scooter

- ✓ Open the saddle
- ✓ Remove battery cover
- ✓ Connect **red** and **black** crocodile clips of ASW-NEXT cable to **+** and **-** of a battery respectively
- ✓ Check what type of diagnostic connector scooter is equipped with
- ✓ Open cap of **OBD II** or unplug **black** 6-pin diagnostic connector



- ✓ Connect a **green** wire of ASW-NEXT cable to **K-LINE** pin in the corresponding diagnostic connector. Use a bridge made from piece of stripped wire.



## 2. General information

Keyless operated immobilizer system of PEUGEOT METROPOLIS 400 2013-2020 uses SMART KEY as in the picture below. For key programming procedures use a key of this type only. SMART KEY ECU is capable to store up to 4 keys.



### 3. Software features

- ✓ Read / Erase diagnostic trouble codes (DTC)
- ✓ Read 5-digit PINCODE
- ✓ Register SMART keys
- ✓ Reset SMART KEY ECU to **VIRGIN**
- ✓ Write PINCODE and ID1 / ID2 to SMART KEY ECU
- ✓ Reprogram SMART KEY ECU with calibration of latest version
- ✓ Reprogram SMART KEY ECU with [patched software](#). This will enable possibility to read PINCODE and IDs of all registered SMART keys.

Explanation of statuses:

```
[18:01:49] SOFTWARE : [ 11.78.22.72.00 ]  
[18:01:49] CALIBRATION: [ 1.10 ]  
[18:01:49]  
[18:01:49] NUMBER OF KEYS STORED: [ 1 ]  
[18:01:49] KEY STATUS: [ KEY RECOGNIZED ]
```

#### **NUMBER OF STORED KEYS**

- 0 – SMART KEY ECU is **VIRGIN**
- 1...4 – Number of stored keys in SMART KEY ECU

#### **KEY STATUS**

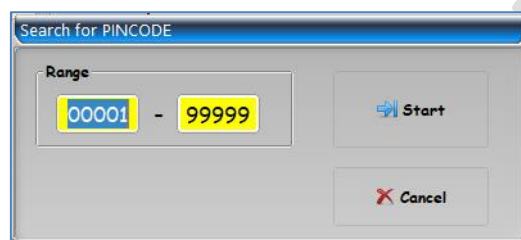
- FAULT – SMART KEY ECU failed to read key
- KEY RECOGNIZED – Key detected and accepted, ignition can be turned on
- KEY NOT RECOGNIZED – Key detected but does not belong to SMART KEY ECU

## 4. Read PINCODE

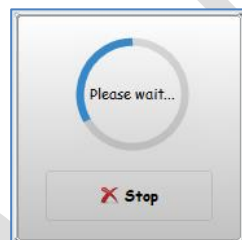
All key programming procedures do require a 5-digit PINCODE. Until SMART KEY ECU is not updated to [patched](#) calibration version, PINCODE can be found only by means of searching it through the range of all possible 5-digit codes (00001-99999).

Time to find depends on a value of valid PINCODE. This may take from several seconds up to 37 minutes if valid PINCODE programmed to SMART KEY ECU is 99999.

- ✓ Ignition must be off
- ✓ Press the button **Read PINCODE** in a software
- ✓ Select range to search pincode within and press **Start** button



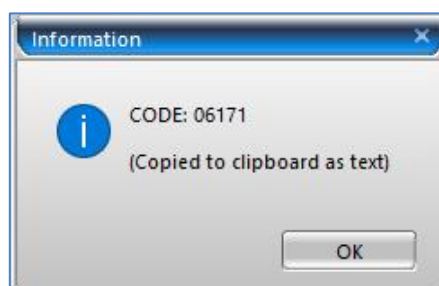
You will see this dialog until program searches for valid PINCODE:



Process can be interrupted at any moment by the user. Last checked value is displayed to continue searching right from this value in the future.

```
[12:48:05] Status : Connect to SMART KEY ECU...OK  
[12:49:21] Status : Read CODE...Cancelled at 03499
```

Message will popup when correct PINCODE is found. At the same time PINCODE value will be copied to clipboard. You can paste it (Ctrl+V) into any text document or paste it to the key programming dialog window when software will ask you to enter it.

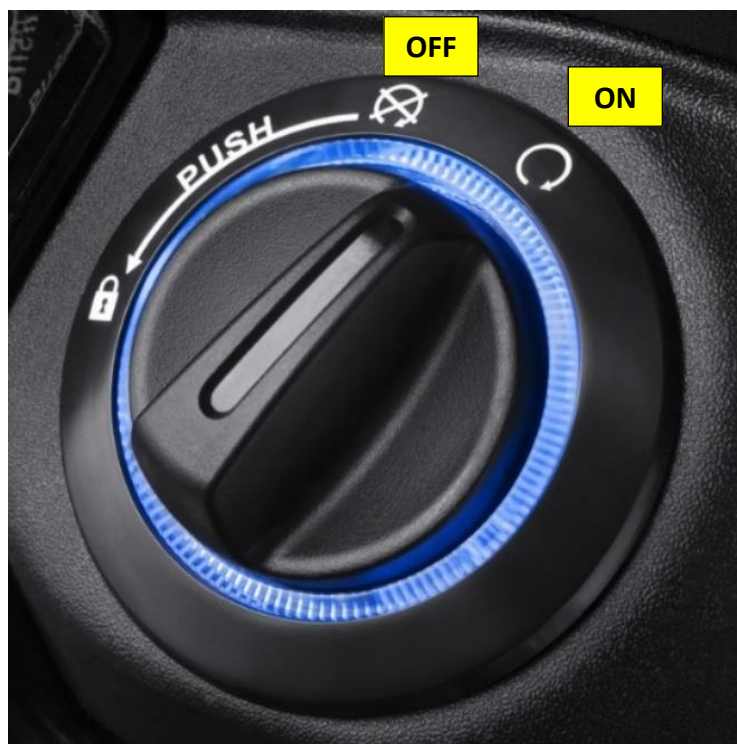


## 5. Programming of additional key

**NOTE:** Only a blank SMART key, or a key that was previously matched to this particular SMART KEY ECU can be learned as an additional key.

In this user manual you will find information [how to produce the blank key](#) from any used key.

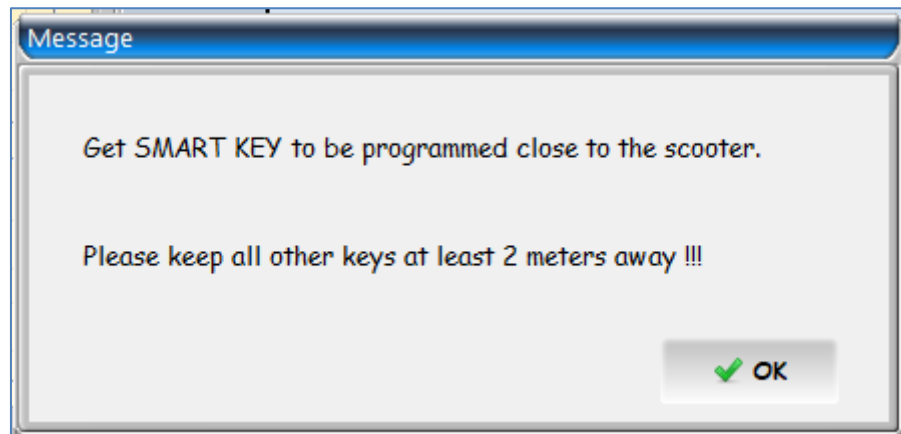
- ✓ Please read a 5-digit PINCODE before to start key learning
- ✓ Take a valid SMART KEY close to scooter
- ✓ Press the ignition control handle **5 times** and turn it to ON position. By pressing control handle **5 times** before to turn ignition on you will cancel automatic power cut-off to prevent ignition being cut-off after 30 seconds.



- ✓ Keep all the SMART keys for at least 2 meters away from the scooter
- ✓ Press the button **Register SMART Key(s)** in a software
- ✓ Enter PINCODE and select number of keys to learn (1...4)



- ✓ When following message is displayed please bring **one key** to be learned **close to the scooter**:



- ✓ When key is presented near to the scooter please press OK
- ✓ Same message will popup as many times, as number of keys to learn was selected in previous dialog.  
Everytime bring **only one** key close to the scooter! Keep all remaining keys (if any) for at least 2 meters away.
- ✓ Ignition turns off for 15 seconds automatically after the last SMART key was successfully recorded.  
Do nothing, just wait and follow software messages.

Ignition turns back on automatically. Please wait a little bit more until software will finish to store key programming values.

Status Log should look like this after successful SMART KEY learning:

```
[16:30:26] Status : Connect to SMART KEY ECU...OK  
[16:30:26] Status : Send CODE...OK  
[16:30:26] Status : Init...OK  
[16:30:47] Status : Learn key #1...OK  
[16:31:03] Status : Store key programming...OK
```

- ✓ Now you can start the engine. In case of no action, ignition will automatically switch off after 30 seconds.
- ✓ Check if all learned keys are accepted by starting scooter with each key.

Go to [troubleshooting](#) chapter in this manual if key programming got failed for any reason.

## 6. Programming when all keys were lost

**NOTE:** Only a blank SMART key can be learned here when all keys were lost.

In this user manual you will find information how to [produce the blank key](#) from any used key.

- ✓ Please read a 5-digit PINCODE before to start key learning
- ✓ Make sure all keys are kept at least 2 meters away from the scooter
- ✓ Use [emergency procedure to turn on ignition](#)
- ✓ Learn keys in exactly the same way as in the case when additional key is programmed. Procedure was described in [Chapter 5](#)
- ✓ Return 5A fuse (F10) to its original position (it was moved during [emergency procedure](#))

Go to [troubleshooting](#) chapter in this manual if key programming got failed for any reason.

## 7. Programming of VIRGIN SMART KEY ECU

**NOTE:** Only a key that was previously matched to this particular scooter can be learned when SMART KEY ECU is VIRGIN. Blank key will be not accepted here!

Identification of VIRGIN SMART KEY ECU should look like in the picture:

```
[16:26:57] NUMBER OF KEYS STORED: [ 0 ]  
[16:26:57] KEY STATUS: [ FAULT ]
```

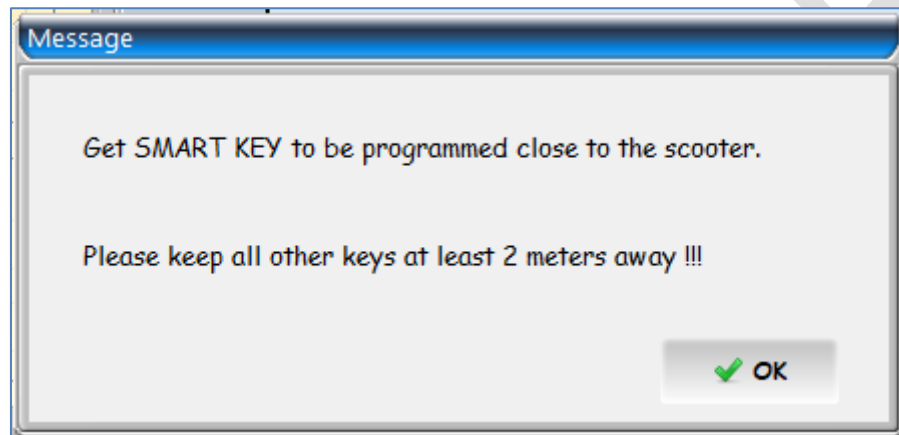
Purpose of the VIRGIN SMART KEY ECU is to replace original SMART KEY ECU when it got faulty or missing at all.

To learn VIRGIN SMART KEY ECU you need to have a programmed key (not blank) and to know PINCODE that is stored inside this key. If original SMART KEY ECU present and is still possible to connect it by diagnostics, you can read PINCODE from original SMART KEY ECU. Otherwise, you should extract PINCODE from the key using technique described in [Chapter 10](#).

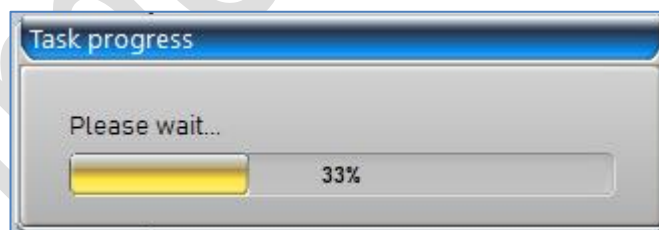


Please follow these steps how to program VIRGIN SMART KEY ECU:

- ✓ Make sure you know valid PINCODE that mathes the key (**same PINCODE as is programmed inside the key you are going to learn**)
- ✓ Bring the key to be programmed close to scooter
- ✓ Make sure any other keys are kept at least 2 meters away from the scooter
- ✓ Press **Register SMART Key(s)** button in the software
- ✓ Enter **PINCODE that matches key** and select **1** key to program, even if you got more keys from same scooter
- ✓ Start key learning. Message as in the picture will popup:



- ✓ Bring **one key** to be learned **close to the scooter** and press OK
- ✓ Progress bar message will take place if key programming was sucessfull. Please wait until it disappear.



- ✓ Ignition will turn on automatically
- ✓ Follow messages until software will finish to store key programming values
- ✓ Now you can start the engine. In case of no action, ignition will switch off automatically after 30 seconds
- ✓ If more keys needs to be learned please start key learning procedure one more time. Learn all remaining keys, including the first key already programmed

Go to [troubleshooting](#) chapter in this manual if key programming got failed for any reason.

## 8. Emergency procedure to turn on ignition without key

Please read PINCODE from the scooter before to proceed with emergency mode if PINCODE is unknown!

Use emergency procedure to turn on the ignition in one of these situations when is not possible to turn on ignition by the regular way of rotating ignition switch:

- All keys lost
- Battery inside SMART KEY has been exhausted
- SMART KEY was damaged

Engine can be started when ignition is switched on by means of emergency procedure.

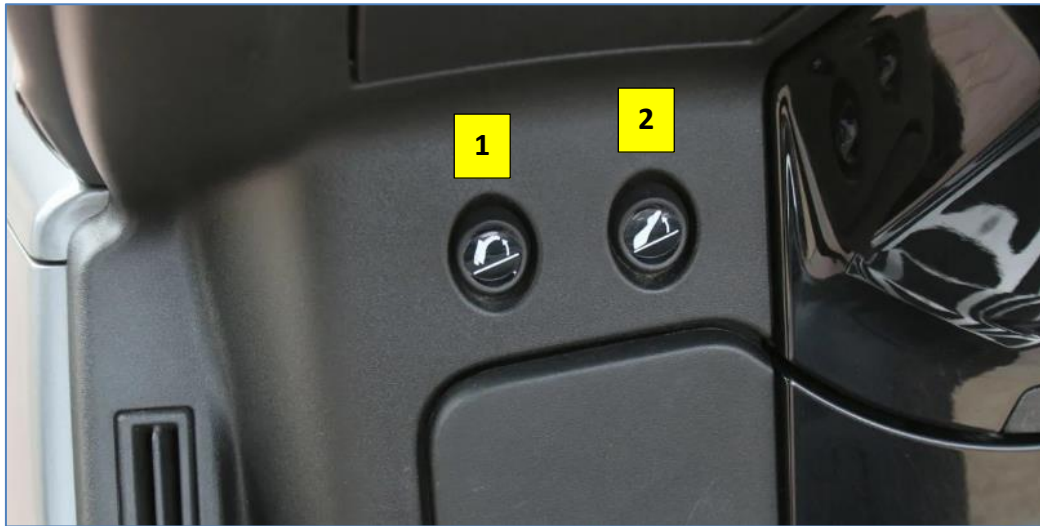
This procedure also is the case when ignition must be turned on to start key learning when all keys were lost.

### Procedure steps:

- ✓ Remove the protective plastic cover to access lock of the rear storage compartment (located at the back right side, next to rear right turn signal light)  
Unlock rear storage compartment with emergency key (if available)
- ✓ Unlock and open the front storage compartment from inside of the rear compartment. Access to front storage compartment's lock is under rectangular plastic cover in the rear storage compartment
- ✓ Remove battery cover to access fuses



- ✓ Move 5A fuse (F10) from its original position to the empty position next to it (by one position to the left)
- ✓ Press down and hold ignition switch for 10 seconds. The blue surround of ignition switch lights up but ignition is not switched on
- ✓ From this moment you have **1 minute** to enter 5-digit PINCODE. It is entered using saddle storage compartment and rear storage compartment control buttons



- ✓ Repeatedly press button **2** as many times as value of the first digit in code
- ✓ Confirm first digit by pressing button **1**. Blue surround of ignition switch flashes once
- ✓ Repeat same two steps for all remaining digits of PINCODE

**NOTE: A ZERO in the code is represented by no press of the button 2. Simply validate with button 1, moving forward to the next digit of PINCODE**

After last digit was entered:

- Illuminated surround of ignition switch goes off if PINCODE is correct. Press down ignition switch and turn ignition on
- Illuminated surround of ignition switch flashes quickly if incorrect PINCODE was entered

**NOTE: You have 5 attempts to set emergency mode. After the last attempt SMART KEY ECU is locked. Valid key or reset to VIRGIN will unlock the SMART KEY ECU.**

For example code to enter is **05103**:

- ✓ First digit is **0** – do not press button **2**
- ✓ Press button **1** to confirm first digit. Blue surround flashes once
- ✓ Second digit is **5** – press button **2** five times
- ✓ Press button **1** to confirm second digit. Blue surround flashes once
- ✓ Third digit is **1** – press button **2** one time
- ✓ Press button **1** to confirm third digit. Blue surround flashes once

- ✓ Fourth digit is **0** – do not press button **2**
- ✓ Press button **1** to confirm fourth digit. Blue surround flashes once
  
- ✓ Last digit is **3** – press button **2** three times
- ✓ Press button **1** to confirm last digit
- ✓ Blue surround flashes quickly if code is incorrect or goes off if a correct code was entered

Locking latch of ignition switch is released if code was accepted. Press ignition switch down and turn ignition on.

Automatic power cut-off is deactivated in emergency mode. That means the ignition will not turn off automatically if engine is not started within 30 seconds.

## 9. Reset SMART KEY ECU to VIRGIN

You may find this function useful when original SMART KEY ECU is damaged or missing at all but at least one original programmed key still present. **Do not reset SMART KEY ECU to VIRGIN if all keys were lost or you got only VIRGIN key.** Procedure for learning of VIRGIN SMART KEY ECU can not be completed using VIRGIN key.

To reset SMART KEY ECU to VIRGIN:

- ✓ Make sure ignition is off
- ✓ Press **Reset SMART KEY ECU** to VIRGIN button
- ✓ Disconnect scotter's battery or unplug SMART KEY ECU for 10-20 seconds

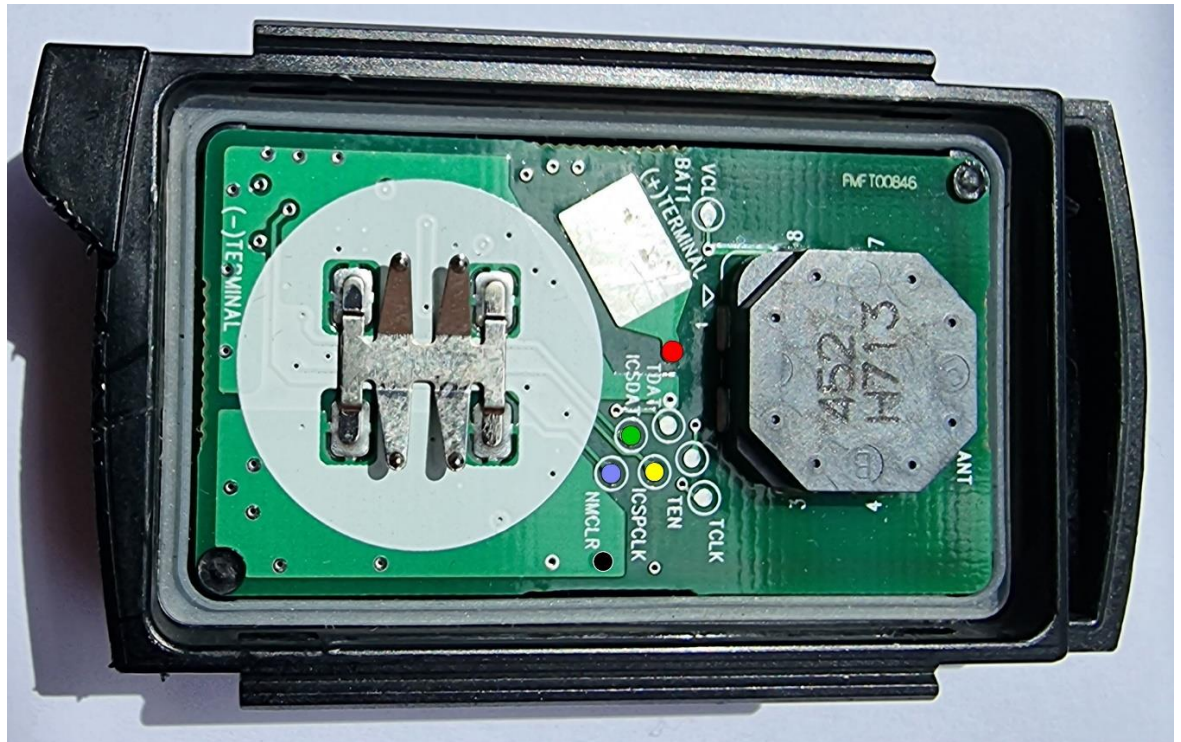
Identification should look like this if procedure was successfully completed:

```
[16:26:57] NUMBER OF KEYS STORED: [ 0 ]  
[16:26:57] KEY STATUS: [ FAULT ]
```

VIRGIN SMART KEY ECU can be programmed later using procedure, [described in Chapter 7](#).

## 10. Inside the SMART KEY

Open key enclosure to get a physical access to printed circuit board (**PCB**). Do not remove PCB completely from the plastic casing, all necessary programming points for memory access are located on the visible side of PCB.



- VDD (+3.3V)
- VSS
- ICSPDAT
- ICSPCLK
- /MCLR (Reset)

MCU: **PIC16LF1828**

Use any programmer that supports PIC16LF1828, for example inexpensive PICkit3 / PICkit4 from Microchip. **Make sure the VDD supplied to PCB from programmer does not exceed 3.3V to prevent possible damage!**

For the operation of SMART KEY internal EEPROM of PIC16LF1828 holds only two main values: **5-digit PINCODE** and key **ID**. Pictures below represents EEPROM data of two different SMART keys from two different scooters:

EEPROM Data	
<input checked="" type="checkbox"/> Enabled	Hex Only
30	55 B9 25 02 CA FF FF FF FF FF FF FF FF FF FF ^
40	55 03 18 86 FF FF FF FF FF FF FF FF FF FF FF
50	01 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
60	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

**ID = B9 25 02**  
**PIN = 31886**

EEPROM Data	
<input checked="" type="checkbox"/> Enabled	Hex Only
30	55 62 D1 11 66 FF FF FF FF FF FF FF FF FF FF ^
40	55 00 55 15 FF FF FF FF FF FF FF FF FF FF FF
50	00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
60	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

**ID = 62 D1 11**  
**PIN = 05515**

**Key ID can not be modified.** If changes were made, data at the line 30 is instantly restored from transponder IC that is connected to PIC16LF1828.

However, **PINCODE can be changed** to any desired value of range 00001-99999. Byte at the left of **PINCODE** (first byte at the line 40) is a marker, is key blank or programmed. For programmed key it must have value **55**.

To reset used SMART KEY to VIRGIN you should overwrite PINCODE with FFs, just as shown in pictures below:

EEPROM Data	
<input checked="" type="checkbox"/> Enabled	Hex Only
30	55 76 FF 1D 18 FF FF FF FF FF FF FF FF FF FF ^
40	55 00 61 71 FF FF FF FF FF FF FF FF FF FF FF
50	00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
60	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

**PROGRAMMED KEY**

EEPROM Data	
<input checked="" type="checkbox"/> Enabled	Hex Only
30	55 76 FF 1D 18 FF FF FF FF FF FF FF FF FF FF ^
40	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
50	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
60	FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

**BLANK KEY**

## 11. Program key ID directly to memory of SMART KEY ECU

Software of ASW-NEXT has function for direct programming of **ID** values of two key positions and possibility to change a value of the **PINCODE**. These values can be written but can not be read when regular calibration is programmed to SMART KEY ECU.

Purpose of this function is to make a key that can start the scooter immediately, without use of [key programming procedure](#).

There are two options for immobilizer data programming:

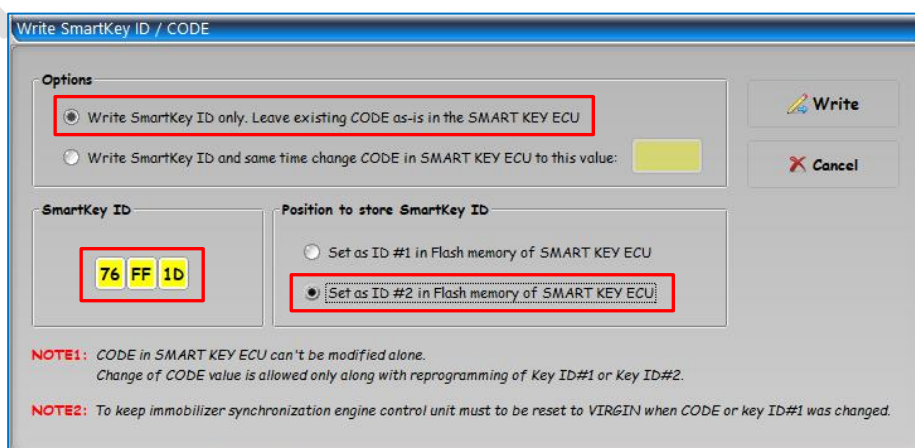
- ✓ You may store key **ID1** and key **ID2** to the SMART KEY ECU, same time leaving original **PINCODE** that is currently programmed in SMART KEY ECU
- ✓ You may store key **ID1** and key **ID2** to the SMART KEY ECU, same time overwriting original **PINCODE** with the new value of PINCODE

**NOTE:** Modification of PINCODE or KEY ID1 in the SMART KEY ECU will lead to loss of immobilizer code synchronization between SMART KEY ECU and engine control module.

Reset Dellorto ECU if this is the case and it will store new code when ignition is turned on with valid key. Read DELLORTO\_SATELIS\_METROPOLIS\_UM.pdf about how to reset ECU to VIRGIN.

There are several ways to match an used key that was previously programmed to another scooter. Let's overview these ways on a basis of examples:

1. Read original **PINCODE** from your scooter as described in [Chapter 4](#)  
For example, it is **06171**
2. Read **ID** from the key, you are going to add, as described in [Chapter 10](#)  
For example, it is **76 FF 1D**
3. Write **PINCODE** from the step 1 (**06171** in this example) to the key as described in [Chapter 10](#)
4. Press button **Write ID / CODE to SMART KEY ECU** in the software



5. Select options **Write SmartKey ID only** and **Set as ID #2**. Press button **Write**

Key is ready. Turn ignition on and try to start the engine  
If engine does not start, please check immobilizer status in ECU.

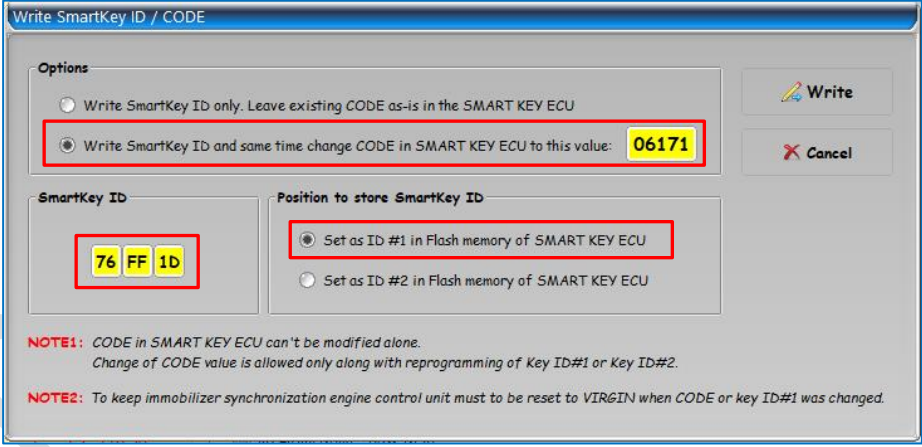
Select  and read identification.

Please reset Dell'orto ECU to VIRGIN if status looks like this:

```
[09:46:11] HARDWARE : MDA4T009001HW004
[09:46:11] SOFTWARE : 1069
[09:46:11] CALIBRATION: MT40D4_4_3
[09:46:11]
[09:46:11] IMMOBILIZER STATUS: [ STARTING DISABLED ]
[09:46:11] NUMBER OF KEYS: [ 4 ]
```


Second way of key making:

1. Read **PINCODE** and **ID** from the key, you are going to add, as described in [Chapter 10](#)  
For example, **PINCODE** is **06171**, **ID** is **76 FF 1D**
2. Press button **Write ID / CODE to SMART KEY ECU** in the software



3. Select options **Write SmartKey ID and same time change CODE** and **Set as ID #1**. Press button **Write**

Now key is ready to turn on ignition, but ECU synchronization was lost because of change of **PINCODE** and **ID1** in the SMART KEY ECU.

Select  and reset ECU to VIRGIN.

ECU will learn new code from SMART KEY ECU when the ignition is switched to ON with the key you just made.



## 12. Reprogram SMART KEY ECU with latest regular calibration

You can update SMART KEY ECU to the latest available **V1.10** if current calibration version is lower than 1.10 or calibration of SMART KEY ECU is corrupted, for example as a result of previous unsuccessful reprogramming session.

Current version of SMART KEY ECU can be checked during **Read Identification**

```
[18:01:49] SOFTWARE : [ 11.78.22.72.00 ]
[18:01:49] CALIBRATION: [ 1.10 ]
[18:01:49]
[18:01:49] NUMBER OF KEYS STORED: [ 1 ]
[18:01:49] KEY STATUS: [ KEY RECOGNIZED ]
```

SMART KEY ECU is not „bricked“ if reprogramming got failed.

## 13. Reprogram SMART KEY ECU with patched calibration

Reprogramming with patched calibration will open ability to read values of **PINCODE** and **ID** of all programmed keys.

```
[18:01:49] SOFTWARE : [ 11.78.22.72.00 ]
[18:01:49] CALIBRATION: [ 1.10 ]
[18:01:49]
[18:01:49] NUMBER OF KEYS STORED: [ 1 ]
[18:01:49] KEY STATUS: [ KEY RECOGNIZED ]
```

**WITH REGULAR  
CALIBRATION**

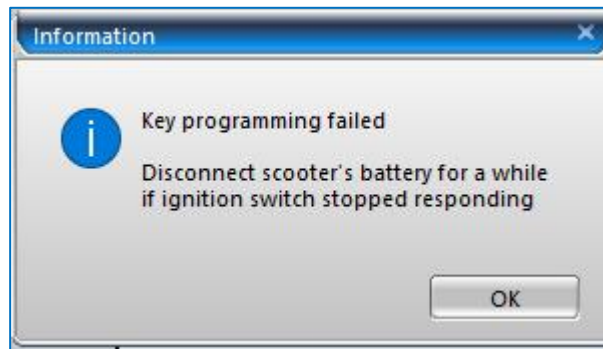
```
[18:58:23] SOFTWARE : [ 11.78.22.72.00 ]
[18:58:23] CALIBRATION: [ 1.20 ]
[18:58:23]
[18:58:23] NUMBER OF KEYS STORED: [ 1 ]
[18:58:23] KEY STATUS: [ FAULT ]
[18:58:23]
[18:58:23] PINCODE: [ 06171 ]
[18:58:23] ID1: [ 76 FF 1D ]
[18:58:23] ID2: [ NOT PROGRAMMED ]
[18:58:23] ID3: [ NOT PROGRAMMED ]
[18:58:23] ID4: [ NOT PROGRAMMED ]
```

**WITH PATCHED  
CALIBRATION**

SMART KEY ECU can be reprogrammed back with regular calibration.  
SMART KEY ECU is not „bricked“ if reprogramming got failed.

## 14. Troubleshooting

- Key programming failed with this message:



**POSSIBLE REASON:** General fault occurred. Please disconnect scooter's battery for a while if SMART KEY ECU completely stopped responding to push or turn action on ignition switch. Ignore this message if ignition switch still continue to respond.

- Key programming failed at the **step 1** (Learn key...) with message in the Status Log as in the picture:

```
[20:18:05] Status : Connect to SMART KEY ECU...OK
[20:18:05] Status : Send CODE...OK
[20:18:05] Status : Init...OK
[20:18:09] Status : Learn key #1...FAILED
[20:18:09] Status : Waiting For Commands
```

**POSSIBLE REASON:**

- ✓ No SMART key was presented close to the scooter when software asked to or key was too far
- ✓ PINCODE in the EEPROM of SMART key is different from PINCODE programmed in SMART KEY ECU (if not a blank key was tried to learn)
- ✓ Faulty LF (134.20 kHz) hands-free antenna or wiring
- ✓ Faulty SMART KEY ECU

- Key programming failed at the **step 2** (Store key programming...) with message in the Status Log as in the picture:

```
[12:09:48] Status : Connect to SMART KEY ECU...OK
[12:09:48] Status : Send CODE...OK
[12:09:48] Status : Init...OK
[12:09:51] Status : Learn key #1...OK
[12:10:08] Status : Store key programming...FAILED
[12:10:08] Status : Waiting For Commands
```

**NOTE1:** Before to store values of programmed keys SMART KEY ECU switches ignition on to supply power to the engine control unit. Then SMART KEY ECU is checking immobilizer status of engine control module.

SMART KEY ECU will reject command to store programmed keys if engine control module is blocked by immobilizer.

Reset Dellorto ECU to VIRGIN and start key learning procedure again.

Read DELLORTO\_SATELIS\_METROPOLIS\_UM.pdf about how to reset ECU to VIRGIN.

**NOTE2:** Key programming procedure is impossible if there is no communication at all between SMART KEY ECU and engine control module (ECU)!

#### POSSIBLE REASON:

- ✓ Wrong synchronization code between SMART KEY ECU and engine control unit (**PINCODE / ID1** differs in SMART KEY ECU and engine control unit)
- ✓ Faulty LIN bus wiring between SMART KEY ECU and engine control unit
- ✓ Hardware fault of engine control unit. *This is very common problem when Dell'orto engine control unit has internal hardware fault*

You should check immobilizer status in the engine control unit if key programming failed at the **step 2** (Store key programming...). Turn ignition on using a valid key when additional key is programmed or use an [emergency procedure](#) to turn ignition on when all keys were lost.

Select  and read identification.

Please reset Dell'orto ECU to VIRGIN and repeat key learning again if immobilizer status in the engine control unit looks as in the picture below:

```
[09:46:11] HARDWARE : MDA4T009001HW004
[09:46:11] SOFTWARE : 1069
[09:46:11] CALIBRATION: MT40D4_4_3
[09:46:11]
[09:46:11] IMMOBILIZER STATUS [ STARTING DISABLED ]
[09:46:11] NUMBER OF KEYS: [ 4 ]
```

- Key programming was successful but ignition switch does not respond to any action. Ignition can not be turned to on or to off

```
[16:30:26] Status : Connect to SMART KEY ECU...OK  
[16:30:26] Status : Send CODE...OK  
[16:30:26] Status : Init...OK  
[16:30:47] Status : Learn key #1...OK  
[16:31:03] Status : Store key programming...OK
```

#### POSSIBLE REASON:

- ✓ Make sure the fuse **F10** was returned to its initial position if ignition before key programming was switched on using an [emergency procedure](#)