

ABRITES DIAGNOSTICS FOR BIKES, SNOWMOBILES

and Water Scooters



www.abrites.com

Important notes

The Abrites software and hardware products are developed, designed and manufactured by Abrites Ltd. During the production process we comply to all safety and quality regulations and standards, aiming at highest production quality. The Abrites hardware and software products are designed to build a coherent ecosystem, which effectively solves a wide range of vehicle-related tasks, such as:

- Diagnostic scanning;
- Key programming;
- Module replacement,
- ECU programming;
- Configuration and coding.

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The Abrites products are to be used by trained and experienced users in diagnostics and reprogramming of vehicles and equipment. The user is assumed to have a good understanding of vehicle electronic systems, as well as potential hazards while working around vehicles. There are numerous safety situations that cannot be foreseen, thus we recommend that the user read and follow all safety messages in the available manual, on all equipment they use, including vehicle manuals, as well as internal shop documents and operating procedures.

Some important points:

Block all wheels of the vehicle when testing. Be cautious when working around electricity.

- Do not ignore the risk of shock from vehicle and building-level voltages.
- Do not smoke, or allow sparks/flame near any part of the vehicle fuel system or batteries.
- Always work in an adequately ventilated area, vehicle exhaust fumes should be directed towards the exit of the shop.
- Do not use this product where fuel, fuel vapours, or other combustibles could ignite.

In case any technical difficulties occur, please contact the **Abrites Support Team by email at** <u>support@abrites.com</u>

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List of revisions

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22.07.2021	Appendix	Harley-Davidson key programming procedure	4.3

I. Introduction

The Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters is a professional diagnostic software designed to work with the Abrites Vehicle Diagnostics Interface produced by Abrites Itd. The Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters allows complete dealer level diagnostic operations for multiple brands and categories of motorcycles, snowmobiles, ATVs, UTVs and water scooters via their on board diagnostic (OBD) connectors or through bench connection. The diagnostics is being performed over the appropriate communication protocol for each model. As well as the standard diagnostic functions such as reading and clearing DTCs, module identification etc. the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters provides advanced diagnostic functions.

tions such as reading and updating configuration data of various modules installed on the vehicles, key learning functions for some models and others functions.

Getting started with the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters requires the users to perform the following:

- Double click the "Quick start" icon on the desktop and go to the motorcycle icon.
- Double click it and the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters will be started.



Before using the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters please go to the "Options" menu and make sure that the "Debug logging" is enabled for troubleshooting purposes (described in section V), then select how long you would like for them to be kept on your computer. In the last drop down tab of the "Options" menu you can select the language that is most comfortable for you to use while working with the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters.

Unit	name			Protoco	DI DIC	
		Options			×	Previo
		Debug Logging	Enabled	•		
		Keep Log Files	3 Months	•		Oper
		Language	English			Nex
Vehide Se Irrent coni Catego i	election		c	K Cancel		Optic
Make Model			•		-	

II. Vehicle diagnostics with the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters

The Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters software consists of basically two parts.

1. Standard diagnostic functions

Reading DTCs/ Clearing DTCs (fault codes)/ Scanning available modules and extended module identification, Data display in the supported vehicles.

When performing standard diagnostics the first step that needs to be performed is to select the type of vehicle that requires the diagnostic service. By default your first screen will be set to the "Vehicle selection" tab:

IIni	t name			Protocol	DTC	
						Previo
						G
						Ope
						Nex
8 Vehick	e Selection	👔 Special Functions				
Categ	context Jory	Bike	•			Optio
Make	4		•	_		

From this screen you will need to select the vehicle "Category" (e.g. Bike, Snowmobile, Water Scooter), the "Make" (e.g. Aprilia, BMW, Ducati, Harley-Davidson, Kawasaki, Gilera, Piaggio, Suzuki, etc.) and the "Model".

NOTE: For the purposes of the manual we are using a Suzuki motorcycle, the model is DL650K7-L2. This motorcycle has two electronic modules available. The principle is similar with any vehicle tested by the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters. The two available electronic modules of this motorcycle are **the Engine Control Unit** and **the Anti-lock Braking System.** In the "Protocol" field of the diagnostic screen we can determine that both units use the KWP protocol.

ŧ	Unit name	Protocol	DTC
12	Engine Control Unit	KWP	
29	Anti-Lock Braking System	KWP	Pr
جر ا Cur	/ehide Selection	•	
N	take SUZUKI	▼	
1			

Select the vehicle as described above:

- Once the correct vehicle is selected the available electronic modules will be displayed in the "Unit name" field.
- Drill into the units in order perform diagnostics for them by double clicking directly over the name of the unit:

gine Control Unit			X
Stablishing di Diagnostic chan	agnostic session v nel is open - K-l:	with selected unit ine, using KWP 2026	<u>م</u>
electron	ic control unit ic	dentification	
Part Number		32920-27GA*	
Component ID		32920-27GA	
Identification	Data Display		Clear log
Identification Read DTCs	Data Display Actuator tests		Clear log Write log
Identification Read DTCs Clear DTCs	Data Display Actuator tests Custom Request		Clear log Write log

The display field will inform you about the establishment of a diagnostic session with the selected unit. It will also provide information about the protocol and on multiple occasions it will automatically display the unit identification in terms of Part number and Component ID.

Selecting the "Identification" button will allow you to see the unit's Part number and Component ID (This is mostly used for searching for replacement parts):

stablishing di	Lagnostic session	with selected unit	
iagnostic char	nnel is open - K-l	ine, using KWP 2026	
electron	nic control unit i	dentification	
art Number		32920-27GA*	
omponent ID		32920-27GA	
clostro	via control unit i	dentification	
electron	inc control unit i	dentification	
art Number omponent ID		32920-27GA* 32920-27GA	
art Number omponent ID		32920-27ga* 32920-27ga	
art Number omponent ID		32920-27GA* 32920-27GA	
art Number omponent ID	1	32920-27G A * 32920-27GA	
art Number omponent ID Identification	Data Display	32920-27GA* 32920-27GA	Clear lo
art Number omponent ID Identification Read DTCs	Data Display Actuator tests	32920-27GA* 32920-27GA	Clear lo Write lo

Selecting the "Read DTC" button will read the Diagnostic Trouble Codes from the unit (if present), it will display it with the factory number of DTC as well as the appropriate text identification (if available):

electron:	c control unit identification	
Part Number	32920-27GA*	
Component ID	32920-27GA	
electron:	c control unit identification	
art Number	32920-27GA*	
component ID	32920-27GA	
read dia	mostic trouble codes	
read dia	nostic trouble codes switch signal circuit malfunction [Not	Present]
read diag 21650: Ignition Identification	nostic trouble codes switch signal circuit malfunction [Not DataDisplay	Present]
read diam P1650: Ignition Identification Read DTCs	mostic trouble codes switch signal circuit malfunction [Not Data Display Actuator tests	Present]

Once the vehicle is repaired and the issue is removed the "Clear DTC" button is selected. This will remove the Diagnostic Trouble Code from the unit's memory thus allowing the vehicle to operate correctly:

ngine Control Unit			×
Component ID		32920-27GA	•
electror	nic control unit i	dentification	
Part Number		32920-27GA*	
Component ID		32920-27GA	
read dia	agnostic trouble c	odes	
P1650: Ignitior	n switch signal ci	rcuit malfunction [Not Present]	E
clear di	iagnostic trouble	codes	
DTCs cleared			
Identification	Data Display		Clear log
Read DTCs	Actuator tests		Write log
Clear DTCs	Custom Request		×
			Close

The "Data Display" button provides a complete "actual value data" view of the vehicle in one, multiple or all parameters by gathering information from the vehicle's sensors. This function is extremely helpful when determining a hidden fault within a vehicle or analyzing the "behavior" after specific modifications or repairs have been made:

+	Parameter	Value	
~	Engine speed	0 rpm	
~	Throttle position	27.5 °	
~	Manifold absolute pressure 1	94.1 kPa	
V	Engine coolant / oil temperature	12.0 °C	
4	Intake air temperature	14.0 °C	
~	Barometric pressure	126.3 kPa	:
~	Battery voltage	0.0 V	
•	O2 sensor	0.0 V	
•	Gear position	Neutral	
~	Manifold absolute pressure 2	94.1 kPa	
4	Desired idle rpm	1343 rpm	-
4	ISC valve position	98 step	
4	Fuel injection time for #1	0.0 ms	
~	Fuel injection time for #2	0.0 ms	
~	Fuel injection time for #3	262.1 ms	
•	Fuel injection time for #4	262.1 ms	
4	Ignition timing for #1	5.1 °	
4	Ignition timing for #2	5.1 °	
4	Secondary throttle actuator position sensor	11.4 %	
4	ISC aperture learned position	100.0 %	
2	Decomo solenoid relav	Off	

The "Data Display" menu provides two different views. The "List" view, as shown above allows selection of sensors with a check box list. The list can be customized and its order can be modified by the user for a more accurate overview of the vehicle values. The "Graph" view allows the monitoring of a parameter in a graphic form in order to determine patterns and behavioral changes. It provides the available sensor signals in a drop down menu where a value can be selected:



"Custom Request" allows the user to send custom signals to the electronic units and monitor the response in a table view. The custom request can be saved for reference:

ustom Request	×
Request	Send
Save Clear	Close

2. Advanced Diagnostics

The "Special functions" tab of the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters will provide you the options to perform "Advanced diagnostics" with the available vehicles:

	Unit name	Protocol	DTC	
				Previou
				6
				Open
				Next
	-au 1			
	Vehicle Selection 11 Special Functions			
1				8
	and and a second		N	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2)	y Learning Read/Update		Open	Options

The "Key learning" special function allows the user to prepare keys for the available vehicles in a simple "step – by – step" manner. Key learning is currently available for various Aprilia, BMW, BRP, Gilera, Harley-Davidson, Vespa and Piaggio models:

Key Learning		×
Please, select mai	ke and click on the button Next	
Diagnostic	APRILIA	
Dump	вмм	
	BRP	
	GILERA	
	HARLEY DAVIDSON	
	PIAGGIO	
	VESPA	
	sk⊒ Back Next →	Cancel

Note: Make sure to follow the instructions you see on the screen. Make sure to have your transponder programmer attached

Programming a key with a Temic transponder requires the TAG key programmer to be connected to your AVDI. Once you have done that the Software will establish a connection to the unit and you will see the following screen:

Unit na	me	Protocol DTC	
	Key Learning		23 Previo
	Please Wait Establishing diagnostic session with	a selected unit	Ope
		Cancel	Nex
lehicle Selec	Confbata	Back Next	ancel
	ContData		

Once the connection to the unit is established you will be asked to select the key position and you should see the following screen:



Once that is done the software will ask you what programming operation you would like to perform. You can clone or replace the existing transponder by selecting the appropriate button:



In this case we see that a master key is used and you should leave the position to its default.

After clicking "Next" the software will inform you how to place the transponder within the key programmer antenna (aerial):



When you click next here you will need to wait a few seconds and the transponder will be ready for use.



Programming keys for BMW motorcycles.

In this case we are using a Hitag 2 transponder and a TAG transponder programmer. The first step is to connect the programmer and establish a diagnostic connection with the unit:

	•	Protocol	DTC	
K	2y Learning			Prev
	Please Wait Establishing diagnostic session v	vith selected unit	X	Op
		Car	(cel	Ne

Note: Use the BMW online software for the latest BMW motorcycles with DST transponders.

The next step is to select the position where you would like to program the key:

Please, select the position on which ye	ou want to program a key
C Key0-Used	⊂ Key 5 - Not Used
C Key 1 - Used	⊂ Key 6 - Not Used
⊖ Key 2 - Not Used	⊂ Key 7 - Not Used
⊂ Key 3 - Not Used	⊂ Key 8 - Not Used
○ Key 4 - Not Used	⊂ Key 9 - Not Used

You should then follow the instructions on the programmer placement in the antenna:

Key Learning		×
	Place Transponder Key on your programmer and click on the button Next. NOTE: Ensure that no other Transponder Key is within 10 cm.	
	Back Next	Cancel

You will then be informed that the transponder is ready to start the engine:

Key Learning		×
	Programming completed successfully!	
	Transponder Key is ready to start the engine.	
	Next 🕬	G Finish

"Read/ Update ConfData" allows the reading and updating of Configuration data from selected electronic control modules of various bikes, snowmobiles and water scooters. The "Read Confdata" button will read the Configuration data from the selected module, the "Update Confdata" will respectfully update the configuration data of the selected module. The selection is performed using a drop down menu within the "Read/ Update ConfData" special function menu. The "Load from file" button allows you to update the configuration data by loading it from a preselected file, saved prior the update. "Make Virgin" allows you to virginize the CONF DATA of the ECUs available for this action.

Jnit		-	· 🔝
	EFI TECHNOLOGY		Read ConfData
	EFI TECHNOLOGY	ACII/AC2I/AC5I/AC8I/AC13I/AC21I/AC23I (95040)	
	EFI TECHNOLOGY	AC19I/AC20I/AC25I/AC27I/AC32I (95080)	Lindete Control
	MAGNETI MARELLI	ACI100/ACI50x/ACI60x (MC68HC05)	Update Combat
	MAGNETI MARELLI	IAW 15 (MC68HC11)	
	MAGNETI MARELLI	IAW 5AM (ST10F269, 95160)	Load from File
	MAGNETI MARELLI	IMM003/IMM006 (MC68HC05E6)	
	PHILIPS DITECH (9	08AZ60A)	Save to File
			Make Virgin
			- X Close

inc.	MAGNETI MARELLI IAW 5AM (ST10F269, 95160)	•	Canon
		*	Read ConfData
			Undate ConfDa
	Please Wait	Ŋ	
	Making virgin ECU		Load from File.
			Save to File
	Cancel		Make Virgin
		דע	
	The "Make Virgin" button allows you to virginize various ECUs with the click of a button.		

III. Connecting your AVDI to various Bikes. Snowmobiles and Water Scooters

1. Unlike cars, where the standard for the diagnostic connection is unified under the OBDII connectors the motorcycles, snowmobiles and water scooters use a variety of connectors. The connection to the on board diagnostic connectors of these vehicles can be established in the following steps:

Determining the location of the diagnostic connectors.

In the majority of cases the diagnostics connectors are located under the seat of the vehicle.

Determining the type of connectors required for the specific vehicle.

Once the type of connector that is required for the vehicle in question is discovered the users can proceed to

the next step.

"Translating" the signal from the On board diagnostic connector to the AVDI.

2. In the photos below you can see various connector locations, types and connection cable pin outs.

Suzuki motorcycles, quads, snowmobiles and water scooters most commonly have their 6 pin connector under the seat



In the photo above you can see it in white, it has a rubber waterproof cap which needs to be removed in order for the connector to be exposed.

2021

The standard Suzuki six pin connector is depicted below:



The pin out for the 6 pin connector is as shown here:



Here you can see the two connected on the vehicle:



The connection from the Suzuki vehicles to your AVDI is established by connecting the 6 pin connector to a DB9 connector and then to a DB25 connector in order for the signal to enter the DB25 connector on the AVDI via the following table:

DB9	DB9
PIN 1 – Ground	PIN 5- Ground
PIN 4 – K—line	PIN 8 – K – line
PIN 9 – 12V	

BMW motorcycles use a 10 pin diagnostic connector. The connection to the OBD II is depicted:



Location of the OBD for some of the most popular BMW models:

S1000RR- under the rear seat cover R1200GS Adventure- under the rear portion of the seat R1200GS- under the seat R1200RT- under seat R1200C- under the left chrome cover HP2 Enduro- under the front of the seat, close to the tank K1200GT- under the rear of the seat K1200S- under the rear of the seat K1200LT- under the seat R1150 GS / Adventure- under the seat R1150 GS / Adventure- under the seat C650X Challenge/Country/Moto- behind right front panel C1-200- behind the backrest of the seat Harley-Davidson motorcycles use a 4(old models) or 6 pin diagnostic connector. The connection to the OBD II is depicted:



Note: Older Harley-Davidson bikes that use a 4-PIN connector may need to communicate through the SAE J1850 protocols. This may require an Abrites J1850 adapter.

Aprilia motorcycles 6 pin to OBDII connection depicted below:



Kawasaki vehicles, in most cases, have the diagnostic pin under the seat.

PINOUTS

For the following connections you will need to connect the modules using a DB9 connector. What you will need to remember is that the DB9 connector is structured in the following way:

PIN1 – GND PIN4 – K-line PIN9 - +12V Magneti Marelli ACI600.01







Magneti Marelli IAW 5AM.GE
 BC.0098058.A





EFI Technology 26-08 CM078307



EFI Technology 28-08 CM078311



Philips 325-024-0G 2 stroke DI



IV. List of supported models

NOTE: Please be informed that module support may vary according to the model year. A full list of all supported models is available at <u>www.abrites.com</u>

V. Troubleshooting steps

1. Connection issues

One of the most common faults that may occur with the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters is the impossibility of the software and interface to connect to the vehicle, subjected to diagnostics. In the example below the vehicle is defined and a module is being selected for diagnostics:

ABR	ITES Diagnostics	s for Bikes, Snowmobiles and Water scooters 1.3	www.abritus72.com		
;	Unit name		Protocol	DTC	
.2	Digital Eng	gine Electronics (DME)	CAN		
9	Anti-lock }	braking system (ABS)	CAN		Previou
9	Electronic	suspension adjustment (ESA)	CAN		Freviou
0	Ignition lo	ock / electronic immobilizer (EWS)	CAN		
50	Instrument	cluster control unit (KOMBI)	CAN		Ģ
2	Basic modu	le (GM) control unit	CAN		Open
					-
					Next
)				
No Vi	ehide Selection	Special Functions		_	
C	ategory	Bike			3
	ntegory				Option
Make					

Once the Abrites Diagnostics for Bikes, Snowmobiles and Water Scooters attempts to establish a diagnostic connection, however, the following error message is displayed:

Electronic suspension adj	ustment (ESA)	
Establishing dia Target unit does Diagnostic not d	agnostic session w s not respond! opened.	h selected unit
Identification	Data Display	Clear log
Read DTCs	Actuator tests	Write log
Clear DTCs	Custom Request	Close

Other connection issues may occur when the transponder programmer is not connected to your AVDI during key learning. You will see the following error:

#	Unit n	ame		Protocol	DTC	_
		Key Learning	alost make and slick on the	butten Navé		Previous
		Bike	APRILIA ABRITES Diagnostics for Bikes, Sn	owmobiles and Water scoo		G Open
			Cannot find transpon	der programmer.	1	Next
Ke	Vehicle Selec	ConfData	~	🖻 Back Next 📫	X Cance	Options

Possible causes for this issue may be:

- The AVDI is not connected to the user's computer.
- The diagnostic connector is inappropriately connected.
- The transponder programmer is not connected.

In both cases please make sure to check the connections or contact support@abrites.com

2. Log files

The log files are an essential part of the troubleshooting process. They are required to establish the root causes of issues, that have occurred unexpectedly. In most cases this is concerning the communication between the AVDI and the modules of the vehicle or the communication between the modules within the vehicle itself. Always make sure to attach the files from when the issue occurred to an e-mail sent to the support team. This will speed up the process of resolving an issue in case it is present. Please note that the log files can be located under: Start -> Programs -> ABRITES software for IDxxxxx-> Log Files (where IDxxxxxx is your ADVI ID) or in the second page of the "Quick Start" menu under the "LOG" icon. In this directory you will see a list of folders. Please access the "BIKE" folder and copy the ".log" files from the time and date the issue occurred and attach them in your e-mail.

The log files icon in the "Quick Start" menu:



VI. Additional cables

From the Abrites online store the users can purchase the following additional cables:

1. CB008 – Cable for AVDI cable for BMW bike diagnostic connector



2. CB301 - AVDI cable for connection with Aprilia Bikes







4. CB303 - AVDI cable for connection with Benelli Bikes





5. CB304 - AVDI cable for connection with Suzuki Bikes (6 pins)

6. CB305 – AVDI Cable for connection with Harley Davidson bikes (CAN/K-Line)



7. CB306 – AVDI Cable for connection with Piaggio bikes



VII. Appendix

BMW R1200GS and other CAS4 late model BMW CAS PINs

Before you start the CAS module looks like this and it is covered in gel. Be very careful and remove some of this gel to reveal the EEPROM. Read this with a programmer of your preference and seal again with an appropriate insulating agent to achieve a neat and safe result:



Harley-Davidson key programming procedure

In order to program a spare key to a Harley-Davidson bikes you need to connect your Abrites CB305 cable to your AVDI(and a J1850 Abrites adapter for the old models with 4-pin connector).

Once the CB305 cable is connected to the OBD connector of the motorcycle open the Abrites Diagnostics for Bikes, Snowmobiles and Water scooters and open the Key learning menu and select "Harley-Davidson":

Unit	name		Protocol	DTC	
	Key Learning				× Prev
	Please, select mak	e and click on the button Ne	ext		
	Diagnostic	APRILIA			
	Dump	BMW			Op
		BRP			
		GILERA			
		HARLEY DAVIDSON			
		PIAGGIO			Ne
		VESPA			
Vehicle Se	electi				
B		,	11		51 6
all a		Na Back	Next 🌩	× Cance	
ey Learning	ConfData		45	Ope	Opti



Select the free key position followed by "Next":

Unit n	ame	Protoco	DTC	
- CHILO II	un c	1100000		
	Key Learning		×	Previo
	Please, select the position on v	which you want to program a	a key	
	⊂ Key FOB 1 [33	23E 24B1 D748 C412 14ED 1 000 0000 0000 0000 0000 0000	385]	Ope
	r2.			
				Ne
Vehide Sele	cti			
		si⊒ Back Next ■	Cancel	6
ey Learning	ConfData		oper	Optic

Enter the key FOB Serial Number (it comes with the Harley-Davidson key):

1				1			
Unit name				Protocol	DTC		
Key Lean	ming					×	Previo
		Enter Key EOB	Serial Number				6
		Enter Key FOB	Serial Nulliber				
		4725 6027 00	10 1701 0011 00	07		-	Ope
		4735 6237 BC	1D 4761 C841 85	527			
							Ne
Weblah Balant							
venide Select							
9			de Back	Next 🔿	× Car	cel	
y Learning Resurveyors							Opti
ConfData							
							6
RITES Diagnostics for	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch	ronization: 27	_	
RITES Diagnostics for	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch	ronization: 27		
RITES Diagnostics for Unit name Key Lean	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch Protocol	ronization: 27		Pres
RITES Diagnostics for Unit name Key Lean	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch Protocol	ronization: 27	×	Prev
SRITES Diagnostics for Unit name Key Lean	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch Protocol	nonization: 27	×	Prev
SRITES Diagnostics for Unit name Key Lean	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch Protocol	onization: 27	×	Prev
SRITES Diagnostics for Unit name Key Lean	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch Protocol III	ronization: 27	×	Prev
SRITES Diagnostics for Unit name Key Lean	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch Protocol IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	ronization: 27	×	Prev
BRITES Diagnostics for Unit name Key Lean	Bikes, Snow	mobiles and Water sc	ooters 2.0	Days untill HW synch Protocol IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	pronization: 27	x	Prev
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Note: In case of all keys lost you need to know the 5-digit PIN code in order to disable the alarm and program a key. The default PIN code you can try with is 1-2-3-4-5.