

2024

FLS BLE BASE





SAINT PETERSBURG, RUSSIA. nikolin.spb.ru

OPERATING INSTRUCTIONS.

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1. PURPOSE AND PRINCIPLE OF OPERATION.

1.1 Assignment

The base of the wireless fuel level sensor BLE.BASE (hereinafter referred to as BLE.BASE), in accordance with Figure 1, provides wireless connection between the fuel level sensor FLS.NIKOLIN.BLE (hereinafter referred to as BLE FLS) and the navigation terminal (hereinafter referred to as tracker).



Figure 1 - External view of the base of the wireless fuel level sensor BLE.BASE The sensor measures the following parameters: fuel level, temperature, battery voltage, RSSI (signal strength) and other parameters as requested by BLE.BASE. The sensor then transmits these parameters via the Bluetooth Low Energy (BLE) Escort BLE protocol. The base data update period is about 10 seconds.

1.2 Principle of operation

BLE.BASE receives requests from external devices via RS-485 interface and responds with level and temperature information. The response is sent via the same RS-485 interface using the LLS protocol 2...5 milliseconds after the request is received. Only requests sent from the network address registered in the sensor base memory are serviced.



2. TECHNICAL SPECIFICATIONS.

Table 2 shows the technical characteristics of BLE.BASE.

Table 2 - Technical characteristics of BLE.BASE.

Characteristics	Wireless fuel level sensor base
	BLE.BASE
Supply voltage, V	9 36
Current consumption, mA, not more than	30
Operating range (under normal operating conditions in the absence	
of interference and obstacles when working with the sensor), m,	10
not less than	
Digital mode:	
- tracker operation interface	RS-485
- communication protocol	LLS
- communication speed	19200 bps
- sensor interface	Bluetooth LE (BLE)
- communication protocol	ESCORT BLE
Output signal range:	0 4095 or 0 1023 units
- digital signal	0 1075 01 0 1025 dinks
Period of data exchange with the sensor, seconds, not more than	10
Receiver sensitivity / transmitter power	-96 dBm / 4 dBm
Protection degree of the shell according to GOST 14254	IP67
Protection against electric shock according to GOST 12.2.007.0	Class III
Operating conditions:	
- ambient temperatures, °C;	-40 +50
- ambient temperature limit, °C;	-60 +85
- atmospheric pressure, kPa	84 106,7
Overall dimensions, mm, not more than	56 x 23 x 10
Weight, kg, not more than	0,1



3. DELIVERY SET.

Table 3 shows the delivery set of BLE.BASE.

Table 3 - BLE.BASE delivery kit.

Name	Quantity
Wireless fuel level sensor base BLE.BASE	1 pc.
Mounting kit	1 pc.
Passport	1 pc.
Packaging	1 pc.



4. OPERATING INSTRUCTIONS.

• Installation and operation of BLE.BASE should be carried out by the personnel who have studied this manual;

• Before installing BLE.BASE it is necessary to carry out its external inspection, if there are any mechanical damages (cracks, chips, dents, etc.) it is not allowed to use it;

• It is forbidden to supply BLE.BASE with supply voltage different from that specified in this manual;

- The BLE.BASE does not contain any parts that may be a source of ignition;
- Do not disassemble the BLE.BASE;

• When installing the BLE.BASE on a vehicle, special equipment or stationary storage facility, follow the approved safety requirements related to this work according to the type of facility to which the BLE.BASE is installed.



5. TRANSPORTATION AND STORAGE.

1. BLE.BASE must be stored in its packaging until it is put into operation. It is stored in dry rooms at ambient air temperature from minus 20 °C to plus 30 °C and relative air humidity not more than 75 %. Conductive dust, aggressive substances and their vapors are not allowed in storage rooms.

2. BLE.BASE is transported in the factory packing in closed vehicles.

6. DISPOSAL.

1. The product is subject to disposal, which is performed by the operating organization in accordance with the norms and regulations established in the territory of the country.

2. BLE.BASE does not contain any harmful substances and components that are hazardous to human health and the environment during and after operation, as well as during disposal. Plastics and non-ferrous metals are recyclable.

3. The device does not contain precious metals in quantities that require accounting.



7. CONNECTING AND SETTING UP BLE.BASE.

BLE.BASE is connected to the tracker and the on-board network of the vehicle, according to Figure 2.



Figure 2 - Diagram of base connection with tracker in RS-485 mode

7.1 Connecting BLE FLS to the tracker via BLE.BASE

Connecting BLE FLS to the tracker via BLE.BASE is performed when the sensor is installed far away from the tracker or there are obstacles between the tracker and BLE FLS, so that it is impossible to establish a Bluetooth connection between the sensor and the tracker.

In order to connect BLE FLS to the tracker via BLE.BASE, you must first connect the base to the tracker. To do this, connect BLE.BASE to the tracker inputs «RS485A» and «RS485B», and supply 12V power to the base. Then turn on the laptop with installed software «NTC Configurator» and connect the cable from the laptop to the tracker.

It is necessary to remember that during installation of BLE FLS, it is necessary to turn it with antenna in the direction of BLE.BASE location.

Next, find BLE.BASE in the mobile application «RFL» by its MAC-address and click connect, according to Figure 3.





Figure 3 - Connecting to BLE.BASE

In the window that appears, select BLE FLS by its MAC address and click on the «Add» icon, as shown in Figure 4.



\times	F	RFL							
Base station									
MAC:		E2:90:D8:35:	6A:4C						
Hardw	are version	rkt.ble.bas	se 0.1						
Interfa	ce speed RS485 RS232	i: 19200 2: 19200	CHANGE						
RE	FRESH	REGISTER MANU	JALLY						
^	TD CA:D1:77:2D:F4:6	D LLS:0	e						
-									
TEMP:	16.0	LVL:	0						
TEMP: RSSI:	16.0 -42	LVL: BATTERY:	0 3.5V						
TEMP: RSSI: Frequenc	16.0 -42 :y: 5621	LVL: BATTERY: TIME:	0 3.5V 0						
TEMP: RSSI: Frequence hw_id 1	16.0 -42 y: 5621 fw_version 14	LVL: BATTERY: TIME: mode 128 tc_n	0 3.5V 0 node 129						
TEMP: RSSI: Frequence hw_id_1 MFR_ID:	16.0 -42 y: 5621 fw_version 14 3862	LVL: BATTERY: TIME: mode 128 tc_n Statu	0 3.5V 0 node 129 s: Normal						
TEMP: RSSI: Frequence hw_id 1 MFR_ID:	16.0 -42 y: 5621 fw_version 14 3862 RKT_FUEL C1:20:5C:2E:85:D	LVL: BATTERY: TIME: mode 128 tc_n Statu 5 LLS:0	0 3.5V 0 node 129 s: Normal						
TEMP: RSSI: Frequenc hw_id 1 MFR_ID:	16.0 -42 y: 5621 fw_version 14 3862 RKT_FUEL C1:20:5C:2E:85:D RKT_FUEL C9:AB:0E:0A:C8:8	LVL: BATTERY: TIME: mode 128 tc_n Statu: 5 LLS:0 A LLS:0	0 3.5V 0 node 129 s: Normal (+						
TEMP: RSSI: Frequenc hw_id 1 MFR_ID: V	16.0 -42 y: 5621 fw_version 14 3862 RKT_FUEL C1:20:5C:2E:85:D RKT_FUEL C9:AB:0E:0A:C8:8 RKT_FUEL FE:DE:02:04:B4:9/	LVL: BATTERY: TIME: mode 128 tc_n Statu 5 LLS:0 A LLS:0	0 3.5V 0 node 129 s: Normal (+						

Figure 4 - Adding BLE FLS to BLE.BASE

After clicking the icon «Add», a window will appear in which you must enter the value «LLS», according to Figure 5. Enter the value «1», it means that the communication address of BLE.BASE and this BLE FLS is equal to one and click «OK».



×	RI	=L	
	Bases	station	
MAC:		E2:90:D8:35:	6A:4C
Hardwar	e version	rkt.ble.bas	se 0.1
Interface Enter LL	RS485: S(0 to 255)	19200	CHANGE
	ок	CANCEL	
TEMP:	16.0	LVL:	0
RSSI:		BATTERY:	3.5V
hw_id 1			node 129
MFR_ID:	3862	Statu	s: Normal
v I	RKT_FUEL C1:20:5C:2E:85:D5	LLS:0	Ð
1	2	3	-
4	5	6	-
7	8	9	$\overline{\mathbf{X}}$
,	0		~

Figure 5 - Entering BLE.BASE and BLE FLS communication address.

After entering the communication address, you can see the LLS of the sensor and the «Delete» icon, which removes the BLE FLS from the database, as well as the sensor parameters, according to Figure 6.

You can also see the «Base Station» tab and the «Interface Speed» item. By clicking on the «CHANGE» button you can specify the interface that is used and set its speed.

After adding BLE FLS and configuring BLE.BASE, click on disconnect «×».



\times	R	FL								
Base station										
MAC:		E2:90:D8	3:35:6A:4C							
Hardw	are version	rkt.bl	e.base 0.1							
Interfa	ce speed RS485: RS232:	19200 19200	CHANGE							
R	EFRESH	REGISTER N	MANUALLY							
^	TD CA:D1:77:2D:F4:6D	LLS:1	×							
10										
TEMP:	16.0		LVL: 0							
TEMP: RSSI:	16.0 -42	BATT	LVL: 0 ERY: 3.5V							
TEMP: RSSI: Frequenc	16.0 -42 sy: 5617	BATT TI	LVL: 0 ERY: 3.5V ME: 0							
TEMP: RSSI: Frequenc hw_id 1	16.0 -42 cy: 5617 fw_version 14	BATTI TI mode 128	LVL: 0 ERY: 3.5V ME: 0 tc_mode 129							
TEMP: RSSI: Frequence hw_id 1 MFR_ID:	16.0 -42 cy: 5617 fw_version 14 3862	BATT TI mode 128 S	LVL: 0 ERY: 3.5V ME: 0 tc_mode 129 Status: Normal							
TEMP: RSSI: Frequence hw_id 1 MFR_ID:	16.0 -42 :y: 5617 fw_version 14 3862 RKT_FUEL C1:20:5C:2E:85:D5	BATT TI mode 128 S LLS:0	LVL: 0 ERY: 3.5V ME: 0 tc_mode 129 Status: Normal							
TEMP: RSSI: Frequence hw_id 1 MFR_ID:	16.0 -42 cy: 5617 fw_version 14 3862 RKT_FUEL C1:20:5C:2E:85:D5 RKT_FUEL C9:AB:0E:0A:C8:84	BATT TI mode 128 S LLS:0	LVL: 0 ERY: 3.5V ME: 0 tc_mode 129 Status: Normal							
TEMP: RSSI: Frequence hw_id 1 MFR_ID: ~	16.0 -42 cy: 5617 fw_version 14 3862 RKT_FUEL C1:20:5C:2E:85:D5 RKT_FUEL C9:AB:0E:0A:C8:84 RKT_FUEL FE:DE:02:04:B4:9A	BATT TI mode 128 S LLS:0 A LLS:0 LLS:0	LVL: 0 ERY: 3.5V ME: 0 tc_mode 129 Status: Normal							

Figure 6 - Viewing BLE FLS through the base.

Note - before configuring the connection of BLE.BASE to the tracker, it is necessary to enter BLE FLS and in the column «Remote control parameters», uncheck «Escort emulation», as well as in «escort_id» set the value to «0», according to Figure 7. Then press save changes «v» and disconnect «×».



X	1D_00000	~			
FLS parameters					
FLS length, mm	0	CHANGE			
Escort emulation					
escort_id		CHANGE			
	EXTRA OPTIONS				
	Calibration				
Frequency with empty FLS	4081	CHANGE			
Frequency at full FLS	2000	CHANGE			
Indications for empty FLS	0	CHANGE			
and the factor of the second					

Figure 7 - Disabling «escort emulation» and «escort_id»

Let's consider the connection of BLE.BASE, on the example of connection to the tracker «SMART S-2423», firm «Navtelecom» LLC. Start «NTC Configurator» and open «Read device configuration». In the window that appears, select the «Bluetooth» tab and uncheck «Use Bluetooth module» in accordance with Figure 8.



🛞 S-2423: Device							_	- 🗆	×
S CAN bus RS-4	1-Wire Temperature Sensors	Inputs Accelerometer	Outputs	Subscribers	TouchMemory (iButto	ons) Security Modes	EcoDriving	Bluetooth	4 >
	Bluetooth device scan mode	nning works in parallel with the r	nain function	sofGSM			\sim		
	List of available devices:			5 01 0001					
	Device	MAC address		Search	Connected device				
				Add	Device:	No	-		
				Cancel	MAC address:				
					Password:				
Save	Save		Switch to	simplified mode					
to file	to device	<< Previou	is page	Select 🔻 Ne	ext page >>		Close	Help	

Figure 8 - Disabling the Bluetooth module

Then go to the «RS-485» tab, and in the item «Fuel level asensor» select «Connect sensor 1». In the column «Network address» set the address that was set in the base settings for the BLE FLS, in our case it is «1», according to Figure 9. Here you can also configure averaging and filtering.



🛞 S-2423:	: Device									×
S CAN b	ous RS-485	1-Wire Temperature	Sensors Inputs	Accelerometer	Outputs Subscribe	rs TouchMemory (iButto	ons) Security Modes	EcoDriving	Bluetooth	4 >
RS-485	Devi	Baud rate	(bps): 19200	~	Parity: None	V Stop Bits	: 1 ~		~	
						Device 2. Intrasco	, 		-	
Fuel	I level sensor		Sensor	type LLS compa	tible	~				
	Sensor	Network ad	dress for the sensitive dress	vity threshold to form on the graph	Ignore threshold in motion	Enable filtration	Averaging window	Additio filtrati leve	nal on	
	Connect sensor	1 1	÷ 50	* *			25 🗘	6	÷	
	Connect sensor	2 2	\$ 50		\checkmark		25 🜩	6	÷	
	Connect sensor	3 3	\$ 50	*			25 🜩	6	-	
	Connect sensor	4 4	\$ 50	-			25 🜩	6	-	
	Connect sensor	5 5	\$ 50	•			25 🜩	6	-	
	Connect sensor	6 6	\$ 50	•	\checkmark		25 🜩	6	-	
Sa to	ave o file	Save to device		<< Previ	Switch to simplified mo	de Next page >>		Close	Help	,

Figure 9 - Setting the network address.

Then go to the «Protocol settings» tab and in the «Fuel level sensor RS-485/BT» column select the BLE FLS data to be displayed according to Figure 10.



🛞 S-2423: Device									– 🗆 X
Protocol Settings	Track Settings Syst	em Settings	CAN bus RS-485	1-Wire Temperature Sensors	Inputs	Accelerometer	Outputs	Subscribers	TouchMemory (iB ◀)
Data transfer protoco	l version FLEX 3.0	~	TMI stored bu	ffer size: 107 byte (maxim	um 512)				
Basic Navigation	Fuel level sensor RS-	485 / BT CA	N Accelerometer / Dr	iving quality Advanced					
			RS-485 / BT Sensor 1 Sensor 2 Sensor 3 Sensor 4 Sensor 5 Sensor 6	Level and temperature	Frequency				
Save to file	Save to device		<< Pre	Switch to simplified mod	e Next page >>			Close	Help

Figure 10 - Customizing the displayed data

After configuring the BLE FLS, click «Save to device» and in the first window that appears click «Yes» and in the second window click «OK», according to Figure 11.



Figure 11 - Loading Settings

Then click close and select «Telemetry» in the program window. Go to the «Fuel level sensors» tab and we can see the values of BLE FLS connected to the tracker through the base, according to Figure 12.



() Telemetry / S-2423 / 540922 / 02.00.42 / 862059060	223651			— 🗆 X
Event Record No. 5421 Type: 40962 Request for the object's cur	Time and date: 09:38:57.0000 23.07.2024	(UTC +3) Operating mode:	Surveillance	Operating mode selection Surveillance Security
Basic Input/output interfaces Accelerometer/Dr	Iving Quality Fuel level sensors CAN Advance RS-485 / BT Fuel level sensor 1 742 Fuel level sensor 2 65530 Fuel level sensor 3 65530 Fuel level sensor 4 65530 Fuel level sensor 5 65530 Fuel level sensor 6 65530	mperature Frequency 28 n/a 0 n/a 0 n/a 0 n/a 0 n/a 0 n/a 0 n/a		
Main packet Current Previous Next	TM keys packet RFID packet Current Current	Timezone: 3 h	Tools Clo	Help

Figure 12 - Checking the operation of «BLE FLS» connected through the base.

If the values are not displayed or changed, close the «NTC Configurator» application and then start it again.

