

# Carramba Libs API Reference Manual

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This manual is for Carramba Libs Package (version 0.0.1, 23 January 2019)

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## Carramba Libs API Reference

What is Carramba Libs? It is a library written for validate personal number like: PESEL, IBAN, NIP, REGON. These numbers are polish personal numbers and are use in Polish goverment administrations. For what was library such as Carramba Libs written? In many country, polish citizens travels, working and enjoys own free time. In business contacts knowledge whois my partner is very important and I will be told, nothing is much importants like these knowledge. Personal numbers like NIP and REGON identify the partner in business directly. When you travel outside our contry, PESEL number do these same. And is very important for users ⇒ this library uses Open Source licensing models and you can look inside and test if it is useful and secure for you.

# 1 A piece of theory.

While checking the correctness of numbers, there is a simple rule: the whole number consists of numbers, each of these digits is multiplied by the balance and the last one, we add products and calculate the sum mod 10 (11), the final digit in the number is a checksum that must match the calculated.

## 1.1 PESEL number

The PESEL number consists of 10 digits, the last one(11) is a checksum. I will not describe the components of a PESEL number, all can be found on the Internet. Briefly, validation is done by:

```
checksum =
(a*1 + b*3 + c*7 + d*9 + e*1 + f*3 + g*7 + h*9 + i*1 + j*3) mod 10;

sum = 10 - checksum;

if sum == 10; then sum = 0; => must be y = 0;

if sum == y; then return NUMBER_VALID; else return NUMBER_INVALID;

weight[] = {1,3,7,9,1,1,3,7,9,1}; => balance
```

## 1.2 NIP number

The NIP number consists of 9 digits and the last 10 is the checksum. You can find out more about the NIP number on the Internet. How to calculate the checksum? It is very simple ...

```
1 2 3 4 5 6 7 8 9 10
a b c d e f g h i      -> next digits in the NIP number
x x x x x x x x x y   -> the balance of each digit, y -> checksum
```

To calculate the checksum, multiply each digit by balance, add the products to each other and calculate the checksum mod 11

```
checksum =
(a*6 + b*5 + c*7 + d*2 + e*3 + f*4 + g*5 + h*6 + i*7) mod 11;

if checksum == 10; then checksum = 0; => must be y = 0;

if checksum == y; then return NUMBER_VALID; else return NUMBER_INVALID;

weight[] = {6,5,7,2,3,4,5,6,7}; => balance
```

## 1.3 REGON number

REGON number consists of 7, 9 or 14 digits, where the last of digits is a checksum. As with the numbers NIP and PESEL, digits from the REGON number are multiplied by the weight, the products are added to each other and the sum calculated modulo 11

```
weight7[] = {2,3,4,5,6,7};
```

```

weight9[] = {8,9,2,3,4,5,6,7};
weight14[] = {2,4,8,5,0,9,7,3,6,1,2,4,8};
if checksum == 10; then checksum = 0;

```

The calculation is made as for the other numbers.

## 1.4 IBAN number

To verify the correctness of the IBAN number, its check sum should be calculated. In Poland, the IBAN number consists of 28 characters, the first two being the country code (PL). The next two characters are the checksum (items 3 and 4) and the remaining ones are the correct bank account number. The account number is up to 30 alphanumeric characters, it is the bank's basic account number (BBAN), some of which must identify the bank. In Poland, BBAN consists of 24 digits, of which 8 digits form the bank's settlement number and the remaining 16 digits specify the customer's account number.

**PLkk AAAAAAAAA BBBB** => Polish IBAN number

**PL** => country code according to the standard  
ISO-3166-1 ([http://pl.wikipedia.org/wiki/ISO\\_3166-1](http://pl.wikipedia.org/wiki/ISO_3166-1))

**kk** => checksum

**AAAAAAAA** => number identifying the bank

**BBBB** => client account number

The IBAN number is written without spaces.

In order to calculate the checksum, one should follow the algorithm:

- we always consider the full IBAN number including the country code
- we are moving the first four characters in the end we change letters into strings of numbers such that A is 10, B is 11 up to Z
- after changing letters into a string of digits, we obtained a string of numbers only, we calculate the sum of modulo 97 and if it is equal to 1 then the checksum is correct

A similar algorithm applies in other countries using the IBAN system.

## 2 API function

In this chapter I describe function provided by the library.

```
int iban_validation_test(const char *iban)
int regon_validation_test(const char *regon)
int pesel_validation_test(const char *pesel)
int nip_validation_test(const char *nip)
const char *carramba_libs_version()
const char *carramba_libs_info(int format)
int carramba_libs_api_test(const char *number)
```

These function are provided by Carramba Libs Package, below I will provide a more detailed description of each function.

### 2.1 IBAN validation function

```
int iban_validation_test(const char* iban)
```

This function provides validate functionality by checking checksum of input string. Return value is depend of that, if input string is valid RETURN\_CODE\_VALID or not RETURN\_CODE\_INVALID. These two constants are defined in header file See Section “carramba\_libs” in *Carramba Libs API Reference Manual*.

Usage:

```
#include    <carramba_libs.h>
#include    <malloc.h>
...

int test = 0;
char *buffer = (char*)malloc(40*sizeof(char));

printf("IBAN: ");

scanf("%s", &buffer);

test = iban_validation_test(buffer);

if (test == RETURN_CODE_VALID)
    printf("IBAN valid\n");
else
    printf("IBAN invalid\n");

free(buffer);

...
```

Like you see implementation is very simply.

### 2.2 REGON validation function

```
int regon_validation_test(const char* regon)
```

This library function test correctness of REGON number. The REGON number is used to identify entities of the national economy and can consist of 7, 9 or 14 digits. Using the function is very simple:

```

#include <carramba-libs.h>

...

const char* number = ""; //here put your REGON number
int test = 0; //default value, that's nothings means

int len = strlen(number); //measure length of tested string

if (len == 7 || len == 9 || len == 14)
    test = regon_validation_test(number)
else
    printf("This %s isn't correct REGON number", number);

if (test == RETURN_CODE_VALID)
    printf("Number: %s is valid REGON number", number);
else
    printf("This %s is invalid REGON number", number);

...

exit(EXIT_SUCCESS);

```

What this example does? The first you must declare some variable and of course tested number REGON. Next in condition `if ... else` you tested length of string and if are valid, use library function to test correctness of input number. Correct length of REGON are: 7, 9 or 14 digits. Return value is tested by conditional `if test == RETURN_CODE_VALID` and if test is TRUE, is printed response at stdin output. Constants `RETURN_CODE_VALID` is defined in header file See Section “carramba-libs.h” in *Carramba Libs API Reference*, like also `RETURN_CODE_INVALID`. Returned value are equal to 1 and -1. Return value is always integer.

## 2.3 PESEL validation function

```
int pesel_validation_test(const char* pesel)
```

Personal number like PESEL are used for indentyfication individuals in the scope of their rights and privileges. PESEL consist of 11 digits and it also lets you check your gender(not implemented yet). Usage:

```

#include <carramba-libs.h>

...

int test = 0;
char *pesel = ""; //put here your PESEL

int len = strlen(pesel);

if (len == 11)
    test = pesel_validation_test(pesel);

if (test == RETURN_CODE_VALID)

```



```

    printf("PESEL: %s -> is valid!\n", pesel);
else
    printf("Input number: %s isn't PESEL or is invalid!\n", pesel);

exit(EXIT_SUCCESS);

```

Like you see above, it is easy to use this function.

## 2.4 NIP validation function

```
int nip_validation_test(const char* nip)
```

NIP number consist of 10 digits, it represents business entity and payer of contributions and taxes. Usage is like shown above

## 2.5 Carramba Libs version print

```
const char* carramba_libs_version()
```

This function return veriosn package version number, which is the same as library version number.

## 2.6 Carramba Libs info print

```
const char* carramba_libs_info(int format);
```

This function returns: short description about your right and freedom, about person who build package and about package build date. Variable *format* can take one of the third values:

```
INFO_FORMAT_PLAINTEXT
```

```
INFO_FORMAT_MARKDOWN
```

```
INFO_FORMAT_MARKUP
```

which allows you to prepare the return value in an adjacent format.

## 2.7 Carramba Libs test function

```
int carramba_libs_api_test(const char* number)
```

This function is simple implementation of all library test function - one function, all test!

```

/*
 * example01.c
 *
 */

#include <carramba_libs.h>
#include <readline/readline.h>
#include <readline/history.h>
#include <malloc.h>
#include <locale.h>

void show_answer(int rest, const char *input);

```

```

int main(int argc, char **argv)
{
    char *input;
    int rest = 0;
    int k = 65;
    //-----
    setlocale(LC_ALL, "C");
    //-----
    const char *about = carramba_libs_info(INFO_FORMAT_PLAINTEXT);
    printf("%s\n", about);
    //-----
    input = (char*)malloc(k*sizeof(char));
    input = readline("Enter personal number (PESEL|NIP|REGON|IBAN) \
\n(button ENTER end input) \
\n(max. 64 characters in line): ");
    printf("\n");
    //-----
    int len = strlen(input);
    if (len == 0 )
    {
        printf("Input error...\nEnds jobs!\n");
        if(input)
        free(input);
        exit(EXIT_FAILURE);
    }
    //-----
    rest = carramba_libs_api_test(input);
    //-----
    show_answer(rest, input);
    //-----
    if (input)
    free(input);
    //-----
    exit(EXIT_SUCCESS);
}

void show_answer(int rest,  const char *input)
{
    int len = strlen(input);

    if (rest == RETURN_CODE_VALID && len == 11)
    printf("Number: %s is valid PESEL\n", input);
    else if ( rest == RETURN_CODE_VALID && (len == 10 || len == 12))
    printf("Number: %s is valid NIP!\n", input);
    else if (rest == RETURN_CODE_VALID && (len == 7 || len == 9 || len == 14))
    printf("Number: %s is valid REGON\n", input);
    else if ( rest == RETURN_CODE_VALID && len > 14 )
    printf("Number %s is valid IBAN!\n", input);
    else

```

```
printf("You enter incorrect number!\nEnded jobs!\n");  
}
```

To build type:

```
gcc example01.c -o example01 -lreadline \  
  'pkg-config --libs carramba-0.1 --cflags carramba-0.1 \  
  --with-path=/usr/local/lib/pkgconfig'
```

### 3 pkg-config support

Library provide pkg-config support by generate carramba-0.1.pc file. What's inside file?

```
prefix=/usr/local
exec_prefix=${prefix}
libdir=${exec_prefix}/lib
includedir=${prefix}/include
```

```
Name: Carramba Libs
Description: Carramba Libs - library for validate IBAN, NIP, REGON, PESEL
Version: 0.0.1
Libs: -L${libdir} -Wl,-rpath -Wl,${exec_prefix}/lib -lcarramba -lgmp
Cflags: -I${includedir}
```

To compile, just use code:

```
gcc ... 'pkg-config --libs carramba-0.1 --cflags \
carramba-0.1 --with-path=/path/to/pkgconfig'
```

## 4 Header file

File `carramba-libs.h` is library header file. What is inside?

```
#ifndef CARRAMBA_LIBS_H_
#define CARRAMBA_LIBS_H_

#define INFO_FORMAT_PLAINTEXT      0
#define INFO_FORMAT_MARKDOWN      10
#define INFO_FORMAT_MARKUP        20

#define RETURN_CODE_VALID          1
#define RETURN_CODE_INVALID        -1

#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <ctype.h>

...

#endif /* CARRAMBA_LIBS_H_ */
```

Show up are definitions some important constant, also are includes some header files standard C library.

The most important definitions of constants are:

```
#define RETURN_CODE_VALID      1
#define RETURN_CODE_INVALID    -1
```

Two all are return value of library function, next constants, are

```
#define INFO_FORMAT_PLAINTEXT      0
#define INFO_FORMAT_MARKDOWN      10
#define INFO_FORMAT_MARKUP        20
```

Three all that are input value to one function `carramba_libs_info()`, they tell how will be look output from that function. Next we have standard in header file, function definitions:

```
#ifndef CARRAMBA_LIBS_H_
#define CARRAMBA_LIBS_H_

...

int iban_validation_test(const char *iban);

int regon_validation_test(const char *regon);

int pesel_validation_test(const char *pesel);
```

```

int nip_validation_test(const char *nip);

const char *carramba_libs_version();

const char *carramba_libs_info(int format);

int carramba_libs_api_test(const char *number);

#endif /* CARRAMBA_LIBS_H_ */

```

And include for manage purpose:

```

...

#ifndef NIP_C_
#define NIP_C_ 1
#endif

#ifndef REGON_C_
#define REGON_C_ 1
#endif

#ifndef PESEL_C_
#define PESEL_C_ 1
#endif

#ifndef IBAN_C_
#define IBAN_C_ 1
#endif

...

```

Application to work with this library need include header file:

```

#include <carramba_libs.h>

...

more

...

```

at the top of source file.

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