

AUTOMATIC NUMBER PLATE RECOGNITION

# Reference Manual

# The Carmen<sup>®</sup>ANPR engine

ANPR RESULTS:

DK AN PR 999

- NUMBER PLATE: ANPR 999
- VEHICLE TYPE: MERCEDES BENZ
- NATIONALITY: DENMARK
- SPEED: 108 MPH / 174 KMH
- BLACKLIST: --- NO ---
- COLOR: BLUE METAL
- OWNER: ZSOLT VANYI
- RECOGNITION TIME: 2020-01-12T15:19:20+00:00



# REFERENCE MANUAL OF THE CMANPR SOFTWARE MODULE

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This document describes the properties (user parameters) of the CARMEN® software and the *cmAnpr engine handler* software module.

## LIST OF THE PROPERTIES AND THEIR IMPORTANCE

PROPERTIES OF THE CMANPR ENGINE HANDLER MODULE		
<a href="#">anprname</a>		
PROPERTIES OF THE CMANPR ENGINES		IMPORTANCE
Properties related to the identification of the current engine	<a href="#">datafile</a>	low
Properties related to processing time	<a href="#">depth</a>	high
	<a href="#">timeout</a>	high
	<a href="#">timeout_wall</a>	medium
	<a href="#">adapt_environment</a>	medium
	<a href="#">contrast_min</a>	medium
	<a href="#">recognitionmode</a>	medium
Properties related to the geometry of plates	<a href="#">size</a>	high
	<a href="#">size_max</a>	high
	<a href="#">size_min</a>	high
	<a href="#">slant</a>	medium
	<a href="#">slant_max</a>	medium
	<a href="#">slant_min</a>	medium
	<a href="#">slope</a>	medium
	<a href="#">slope_max</a>	medium
	<a href="#">slope_min</a>	medium
	<a href="#">xtoyres</a>	low
Properties related to filtering outputs based on license plate characteristics	<a href="#">general</a>	high
	<a href="#">typeweight</a>	medium
	<a href="#">colortype</a>	low
	<a href="#">nchar_max</a>	low
	<a href="#">nchar_min</a>	low
Properties related to customization of results	<a href="#">gaptospace</a>	medium
	<a href="#">local_character_permutation</a>	medium
	<a href="#">platetypeinfos</a>	medium
	<a href="#">autotypemodification</a>	low
	<a href="#">convert0to0</a>	low
	<a href="#">countryname</a>	low
	<a href="#">cyrillic_style</a>	low
	<a href="#">local_character_conversion</a>	low
	<a href="#">unicode_in_text</a>	low
Properties related to color recognition	<a href="#">analyzecolors</a>	low
	<a href="#">whitebalance</a>	low
Properties related to the position of license plates in input images	<a href="#">posfreq</a>	low
	<a href="#">ROI</a>	medium
	<a href="#">ROU</a>	medium
	<a href="#">posfreqhalflife</a>	low
	<a href="#">posfreqhistxs</a>	low
	<a href="#">posfreqhistys</a>	low
	<a href="#">posfreqweight</a>	low
Properties related to image quality	<a href="#">gamma</a>	low
Properties related to the calculation of the confidence level	<a href="#">confidencemode</a>	medium
	<a href="#">confidencemode_x</a>	low
	<a href="#">plateconf</a>	low
	<a href="#">zeroconfidenceresults</a>	low
Properties related to memory handling	<a href="#">heapfreefreq</a>	low

# DESCRIPTION OF THE PROPERTIES OF THE CMANPR ENGINE HANDLER MODULE

## 1. ANPRNAME

NAME OF THE CURRENT ENGINE

The name of the current engine can be altered during runtime. Its value can be set according to the following scheme: "engine module name: property group". For example: cmanpr-eur-7.3.12.5\_20Q2

*Possible value:* character string

*Default value:* varies with each engine release

*Suggested value:* not applicable

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## POSSIBLE VALUES OF CMANPR ENGINE PROPERTIES

NAME (in alphabetical order)	POSSIBLE VALUES	DEFAULT VALUE
<a href="#">adapt_environment</a>	{-1,0,1,2,3,4,..8,..16,..32,..64,..127}	engine dependent
<a href="#">analyzecolors</a>	{0,1,2,4,5,8,9}	0
<a href="#">autotypemodification</a>	{0,1}	0
<a href="#">colortype</a>	{0,1,2}	0
<a href="#">confidencemode</a>	{0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15}	7
<a href="#">confidencemode_x</a>	{replace "X" with number 0 - 15}	n/a
<a href="#">contrast_min</a>	[0..255]	engine dependent
<a href="#">convert0to0</a>	{0,1}	0
<a href="#">cyrillic_style</a>	{0,1}	0
<a href="#">datafile</a>	character string	n/a
<a href="#">depth</a>	[0..500]	engine dependent
<a href="#">gamma</a>	{0,1}	0
<a href="#">gaptospace</a>	{0,1,2}	0
<a href="#">general</a>	{0,1,3,4,5,6,7,8,9,10,11,12,13,14,15}	engine dependent
<a href="#">heapfreefreq</a>	{0,1}	0
<a href="#">local_character_conversion</a>	{0,1,2,3}	0
<a href="#">local_character_permutation</a>	{0,1,2,3}	0
<a href="#">nchar_max</a>	positive integers	engine dependent
<a href="#">nchar_min</a>	positive integers	engine dependent
<a href="#">plateconf</a>	{0,1,2}	2
<a href="#">posfreq</a>	character string	empty string
<a href="#">posfreqhalflife</a>	[0..1048576]	0
<a href="#">posfreqhistxs</a>	[2..64]	16
<a href="#">posfreqhistys</a>	[2..64]	16
<a href="#">posfreqweight</a>	[0..100]	50
<a href="#">recognitionmode</a>	{0,1}	0
<a href="#">ROI</a>	polygon(s)	empty
<a href="#">ROU</a>	polygon(s)	empty
<a href="#">size</a>	positive integers	engine dependent
<a href="#">size_max</a>	positive integers	engine dependent
<a href="#">size_min</a>	positive integers	engine dependent
<a href="#">slant</a>	integer numbers	engine dependent
<a href="#">slant_max</a>	integer numbers	engine dependent
<a href="#">slant_min</a>	integer numbers	engine dependent
<a href="#">slope</a>	integer numbers	engine dependent
<a href="#">slope_max</a>	integer numbers	engine dependent
<a href="#">slope_min</a>	integer numbers	engine dependent
<a href="#">timeout</a>	non-negative integers	1000
<a href="#">timeout_wall</a>	non-negative integers	0
<a href="#">typeweight</a>	string	empty string
<a href="#">unicode_in_text</a>	{0,1,2}	1
<a href="#">whitebalance</a>	[0..100]	100
<a href="#">zeroconfidenceresults</a>	{0,1}	0

# DESCRIPTION OF THE PROPERTIES OF THE CMANPR ENGINES

## 1. DATAFILE

### NAME OF THE ENGINE'S DATA FILE

This property specifies the knowledge file (.dat) used by the engine. By default, the name of the datafile corresponds to the name of the engine.

For example, the `cmanpr-eur-7.3.12.5_20Q2` engine's datafile is `gxsd-cmanpr-7.3.12.5-eur.dat`. The role of this property is to query the name of the datafile after initialization and to include this information in the application's log.

*Possible values:* character string  
varies with each engine release; default property value can be queried by the

*Default value:* `GetProperty()` function

*Suggested value:* leave the default value

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# PROPERTIES RELATED TO PROCESSING TIME

## 1. DEPTH

### HEURISTIC SENSITIVITY

cmAnpr engines with country/state recognition use more sophisticated algorithms than general ones, which not only provides country/state recognition but also improves text accuracy in most cases. If the recognition time is too long for the application, the depth of search may be lowered using this parameter; although the accuracy of both text and country/state reading will be affected. If the application is not time-sensitive, then the depth value may be increased to get higher recognition accuracy. [1..300]: depth of the heuristic sensitivity.

*Possible values:* [1..300].

*Default value:* varies with each engine release; default property value can be queried by the `GetProperty()` function

*Suggested value:* leave the default value

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## 2. TIMEOUT

### 2.1. TIMEOUT

#### CPU TIME LIMIT

Sets the maximum working time for the CPU in milliseconds in which the module tries to find license plates.

You can always give the module sufficient time by using this timeout. However, this could result in longer runtimes if the system is busy.

The interval starts when `cm_findfirst()` is called.

At the end of this period, the engine tries to finish searching for new plates and any additional call of `cm_findnext()` will result no plates found. Zero timeout value means no time limit.

By setting the timeout value before the `cm_findnext()` call, the timing will be restarted and the evaluation lasts till the newly specified time interval.

#### Example:

If the value of the timeout is set to 500

The `cm_findfirst()` returns successfully after 200 ms. In this case after additional `cm_findnext()` call 300 ms would be available. However, if the timeout is set to 500 after `cm_findfirst()`, then 500ms would be available for further `cm_findnext()` calls.

**Possible values:** non-negative integers

**Default value:** 1000

**Suggested value:** 1000 – on servers and desktop computers

5000 – on slower computers with less than 2GHz CPU clock speed

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### 2.2. TIMEOUT\_WALL

#### REAL TIME LIMIT

Sets the length of the time interval in milliseconds in which the module tries to find license plates.

You can ensure that the module won't run much longer than the desired time by using this `timeout_wall` property. However, the results could possibly be worse if the system is busy and the `timeout_wall` is set too low.

The interval starts when `cm_findfirst()` is called.

At the end of this period, the engine tries to finish searching for new plates and any additional call of `cm_findnext()` will result no plates found. Zero `timeout_wall` value means no walltime limit.

By setting the `timeout_wall` value before the `cm_findnext()` call, the timing will be restarted and the evaluation lasts till the newly specified time interval.

Example:

If the value of the `timeout_wall` is set to 500

The `cm_findfirst()` returns successfully after 200 ms. In this case after additional `cm_findnext()` call 300 ms would be available. However, if the `timeout_wall` is set to 500 after `cm_findfirst()`, then 500ms would be available for further `cm_findnext()` calls.

**Possible values:** non-negative integers

**Default value:** 0

**Suggested value:** equal or greater values than the value set for timeout

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## USAGE

It is possible to use the `timeout` and the `timeout_wall` parameters together or just one or the other. If either timeout is reached, the engine tries to finish searching for new plates and any additional call of `cm_findnext()` will result no plates found. If both parameters are used, the `timeout` value should always be smaller than the `timeout_wall` value or equal to it. Otherwise it has no effect.

It can happen that in case of a busy processor the ANPR process takes a long time (2-4 seconds) even if the `timeout` is set to 1000 ms, because during this 2-4 seconds CARMEN can only use the processor for around 1000 ms.

In either case, if Carmen® has found a License Plate close to the set `timeout/timeout_wall` limit, the process will be finished as quickly as possible. So, if you are setting the `timeout_wall` property to 1000 ms the ANPR process cannot take much longer than 1000 ms, but if you are setting only the `timeout` property 1000 ms the ANPR process could take up to 2000-4000 ms depending on the CPU usage.

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### 3. ADAPT\_ENVIRONMENT

#### ACCELERATED MODE BASED ON PHYSICAL LOCATION AND OTHER CHARACTERISTICS OF THE LICENSE PLATE

This property can substantially boost recognition speeds in case the country/state recognition feature is enabled. The engine is capable of statistically adapting to type, location and geometrics of the license plates on the images.

##### Possible values:

**1** – This allows the cmAnpr engine to adapt to its environment by applying a real-time statistical prediction algorithm to quickly assess the physical location of the particular deployment. The engine will begin to anticipate the license plate types of those countries/states that it encounters most frequently. With this feature enabled, it often takes only a few plate recognitions for the software to start delivering results up to twice as fast.  
To turn off this feature, set value to 0.

**2** – This enables [posfreq](#) and at the same time, [posfreqhalflife](#) is set to 1000. Collection of statistical information is started on the image divided to 16x16 equal sections (if this is not overwritten previously by unique [posfreq](#), [posfreqhalflife](#), [posfreqhistxs](#), [posfreqhistys](#) settings) This works as before, as it would have been set individually by those 2 parameters.

**4, 8, 16, 32, 64** – By setting these values, collection of statistical information and adaptation includes also some geometric parameters and the contrast of the license plates. Continuous runtime adaptation of the engine makes recognition more accurate and faster.  
These geometric parameters are: [size](#), [size\\_min](#), [size\\_max](#), [slant](#), [slant\\_min](#), [slant\\_max](#), [slope](#), [slope\\_min](#), [slope\\_max](#), [contrast\\_min](#) parameters. This makes manual setting of those parameters unnecessary.

**4** – height of the characters

**8** – width of the characters

**16** – slant

**32** – slope

**64** – contrast

By setting the `adapt_environment` parameter to `"-1"`, all the collection and adaptation of all the information - like license plate location, character size (height, width), slant, slope, contrast is turned on.

**Please read the notes on the next page!**

**! Important**

Notes for using adapt\_environment:

**Timeout:** Avoid setting this value too low! Some engines have been trained for a large plate type variety, but a specific deployment may only encounter a few different country/state plates on a regular basis (e.g. Arabic engine used in Bahrain). Although the adapt\_environment feature may dramatically improve recognition speeds for those country/state plates that are frequent at a specific location, “infrequent” plate types will still require about the same recognition times as without this feature enabled. Consequently, using a [timeout](#) value that is too low (e.g. based on the mean recognition time calculated when this acceleration feature is enabled) may cause the system to skip “infrequent” plates without providing a result, as the recognition cycle would time out before being able to provide a result.

**Recognition accuracy:** Our tests indicated that enabling the adapt\_environment feature does not negatively impact text reading accuracy, while at the same time substantially increasing recognition speeds. However, the accuracy of country/state identification is more sensitive to this feature. Consequently, this feature might present some issues that would require careful selection of an appropriate [timeout](#) value or a secondary screening for occasional false positives of country/state identification. For example, no result or misread might be provided for a previously recognized license plate, following a sequence of different plate images. An issue like this, could be the result of either a low [timeout](#) value (read previous note), or a unique anomaly, where the internal statistical analysis expected a “frequent” country/state plate at the specific location, while the actual plate was a similar but “infrequent” type.

**Error reporting:** Using adapt\_environment makes it difficult to reproduce errors or misreads, because the engine continuously changes recognition parameters. Before reporting an error, also process the image with this acceleration feature disabled to help identify whether it is an acceleration-related issue.

**Possible values:** Possible values: {-1,0,1,2,3,4,8,16,32,64 – and all combinations of the positive numbers}

**Default value:** 3 (1+2) – but varies by engines

**Suggested value:** -1 – if the images are collected in the same physical location

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## 4. CONTRAST\_MIN

### MINIMUM CONTRAST

The minimum difference between the grayscale value of the number plate characters and the plate background.

#### Note

No license plate result will be returned where the grayscale contrast is smaller than the specified value.

**Possible values:** [0..255]

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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## 5. RECOGNITIONMODE

(available from version 7.3.11.242)

Some engines contain more than one recognition possibility. You can check the current engine actual values and options as explained below.

`GetProperty()` „**recognitionmodes**“: it will give you back the possible values with its number and name:

0 – Classic

1 – Quick

`GetProperty()` „**recognitionmode**“: it will give you back the actual recognition mode name as a string

`SetProperty()` „**recognitionmode**“: you can set the recognition mode with this command. You can use number (0,1) and the string (Classic, Quick - case sensitive) as well

Please note that this parameter is not saved into `gxsd.dat`.

**Possible values:** {0,1}

**Default value:** 0

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# PROPERTIES RELATED TO THE GEOMETRY OF PLATES

## 1. SIZE

### AVERAGE HEIGHT OF THE CHARACTERS

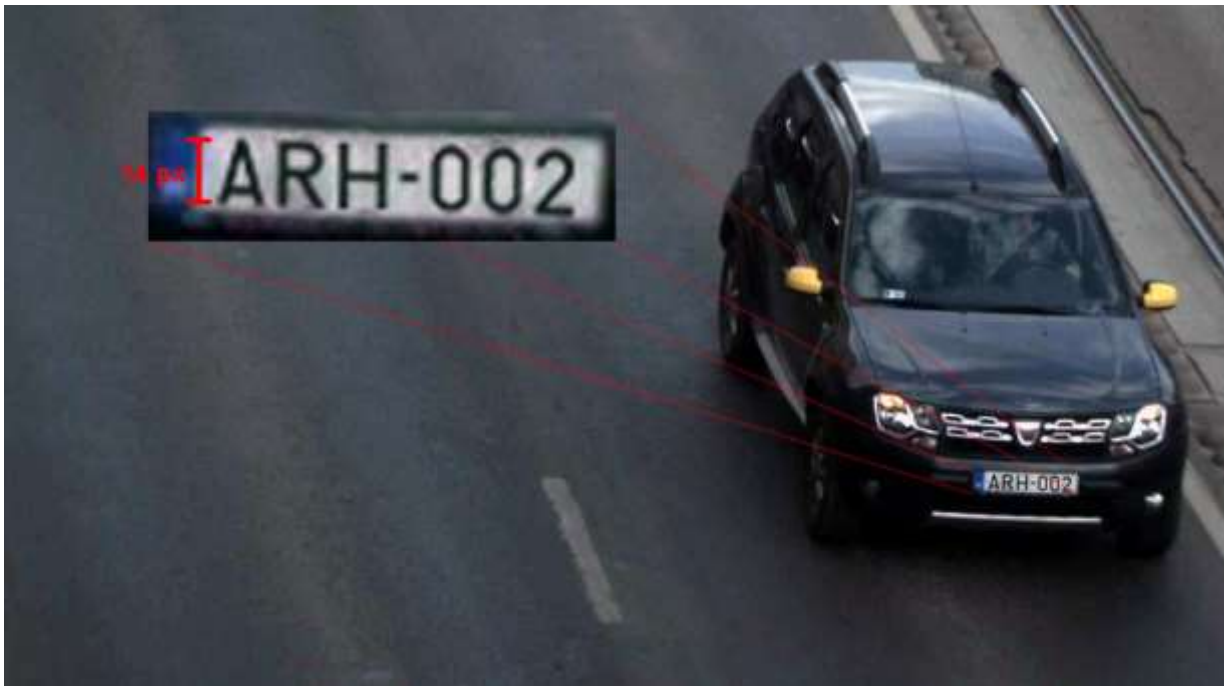
The average height of the number plate characters in the image in pixels.

**Possible values:** positive integers (between 10 and 80)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** [20..50] (between 20 and 50), depending on the character heights in the input images

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## 2. SIZE\_MAX

### MAXIMUM HEIGHT OF CHARACTERS

The maximum height of the number plate characters in the image in pixels.

**Possible values:** positive integers (between the actual [size](#) value and 80)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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### 3. SIZE\_MIN

#### MINIMUM HEIGHT OF THE CHARACTERS

The minimum height of the number plate characters in the image in pixels.

**Possible values:** positive integers (between 10 and the actual [size](#) value)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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#### Note

$\text{size\_min} \leq \text{size} \leq \text{size\_max}$

So, the size value has to be equal to or greater than size\_min and equal to or less than size\_max otherwise the engine returns no data.

### 4. SLANT

#### AVERAGE SLANT OF THE NUMBER PLATE

The average slant of the number plate characters in the image. This value is represented in percent (%) and it is positive if the vertical axis of the characters slants to the left viewing from bottom to top.

**Possible values:** integer numbers (between -100 and 100)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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positive SLANT



negative SLANT



$$\text{Slant} = \frac{x}{y} \cdot 100$$



## 5. SLANT\_MAX

### MAXIMUM SLANT OF THE NUMBER PLATE

The maximum slant of the number plate characters in the image. This value is represented in percent (%) and it is positive if the vertical axis of the characters slants to the left viewing from bottom to top.

**Possible values:** integer numbers (between the actual [slant](#) value and 100)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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## 6. SLANT\_MIN

### MINIMUM SLANT OF THE NUMBER PLATE

The minimum slant of the number plate characters in the image. This value is represented in percent (%) and it is positive if the vertical axis of the characters slants to the left viewing from bottom to top.

**Possible values:** integer numbers (between -100 and the actual [slant](#) value)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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#### Note

$slant\_min \leq slant \leq slant\_max$

So, the slant value has to be equal to or greater than `slant_min` and equal to or less than `slant_max` otherwise the engine returns no data.

## 7. SLOPE

### AVERAGE SLOPE OF THE NUMBER PLATE

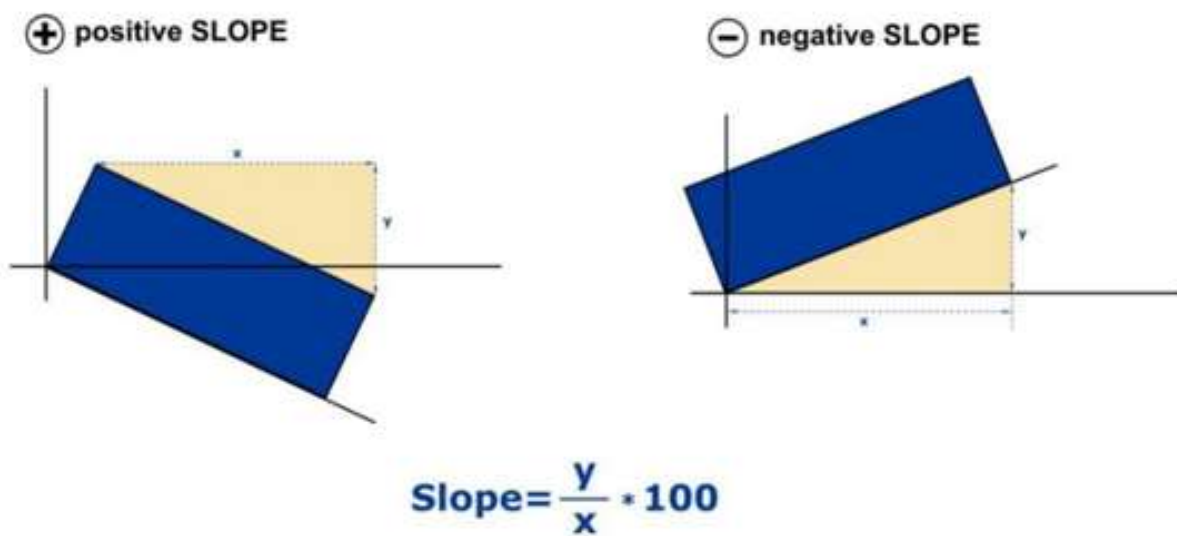
The average slope of the number plate in the image. This value is represented in percent (%) and it is positive if the horizontal axis of the number plate slopes downwards viewing from left to right.

**Possible values:** integer numbers (between -100 and 100)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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## 8. SLOPE\_MAX

### MAXIMUM SLOPE OF THE NUMBER PLATE

The maximum slope of the number plate in the image. This value is represented in percent (%) and it is positive if the horizontal axis of the number plate slopes downwards viewing from left to right.

**Possible values:** integer numbers (between the actual [slope](#) value and 100)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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## 9. SLOPE\_MIN

### MINIMUM SLOPE OF THE NUMBER PLATE

The minimum slope of the number plate in the image. This value is represented in percent (%) and it is positive if the horizontal axis of the number plate slopes downwards viewing from left to right.

**Possible values:** integer numbers (between -100 and the actual [slope](#) value)

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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#### Note

$\text{slope\_min} \leq \text{slope} \leq \text{slope\_max}$

So, the slope value has to be equal to or greater than `slope_min` and equal to or less than `slope_max` otherwise the engine returns no data.

## 10. XTOYRES

THE RATIO OF HORIZONTAL AND VERTICAL DIMENSIONS OF PLATES

### X to Y resolution – only for analog input!

This value is represented in percentages (%). This parameter uses 2 values for calculation: the ratio of horizontal and vertical resolution of the plate in the image and the real life horizontal and vertical size ratio of the plate.

This parameter can be set manually using images that contain plates of the same type. Calculating the average of the ratio "r" of the width and the height of the plates on images and by calculating the "R" ratio of the real width and height of the actual plate:

$$xtoyres = [(100*r)/R+0.5]$$

#### Example 1 (metric):

Physical dimensions: The width of Hungarian plates is 51 cm, the height is 11 cm, so the ratio of the width and the height is  $51/11=4.6363$ .

Dimensions on images: On 100 images with Hungarian plates, the average ratio of the width and the height of plates is 5.25.

In this case, using the formula:

$$xtoyres=((100*5.25)/4.6363)+0.5=\sim 114.$$

#### Example 2 (imperial):

Physical dimensions: The width of North American standard plates is 12 inches, the height is 6 inches so the ratio of the width and the height is  $12/6=2$ .

Dimensions on images: On 100 images with USA plates, the average of the width and the height of plates is 1.79. In this case, using the formula:

$$xtoyres=((100*2)/1.79)+0.5=\sim 112.$$

#### Note

If you have regular digital camera that does not change the ratio of the width and the height of the objects, simply use 100.

This property has a role only if there is significant distortion in the dimensions of the objects, for example in case of half-frames taken by analog cameras.

**Possible values:** positive integers

**Default value:** 100

**Suggested value:** 100

(Zero value setting of *xtoyres* means automatic re-setting of *xtoyres* to 100.)

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# PROPERTIES RELATED TO FILTERING OUTPUTS BASED ON LICENSE PLATE CHARACTERISTICS

## 1. GENERAL

SELECTING GENERAL OR SPECIAL RESULT DELIVERY MODE

### Note

The value of this property has direct effect on the value of the [typeweight](#) property. For direct selection of certain countries/states, use [typeweight](#).

This property lets you select the desired reading modes of license plates, ADR plates, EADR plates (Empty ADR, ADR plates without text), and plates with unknown type (type refers to cmNP::type).

This property can filter 4 kinds of LPR results:

1. Text results with unidentified license plate type (type=0)
2. Results with identified license plate type (type range [0..997000])
3. Results with identified ADR plate type (type range [997000..997999])
4. Results with EmptyADR plate type (type=999980..999999)

The following table shows what kinds of results are returned for each possible value of general property:

values of general	Expected type of the result			
	unidentified license plate type (type=0)	IDENTIFIED license plate type (0<type<997000)	ADR plate (997000<=type<=997999)	EmptyADR plate (999980<=type<=999999)
0		x		
1	x	x		
2 (do not use)				
3	x			
4		x	x	
5	x	x	x	
6			x	
7	x		x	
8		x		x
9	x	x		x
10				x
11	x			x
12		x	x	x
13	x	x	x	x
14			x	x
15	x		x	x

**Note**

Value 2 is intentionally omitted from the above table. If *general* is set to 2, no result will be returned!

For LPR reading without ADR information, values {0,1,3} should be used.

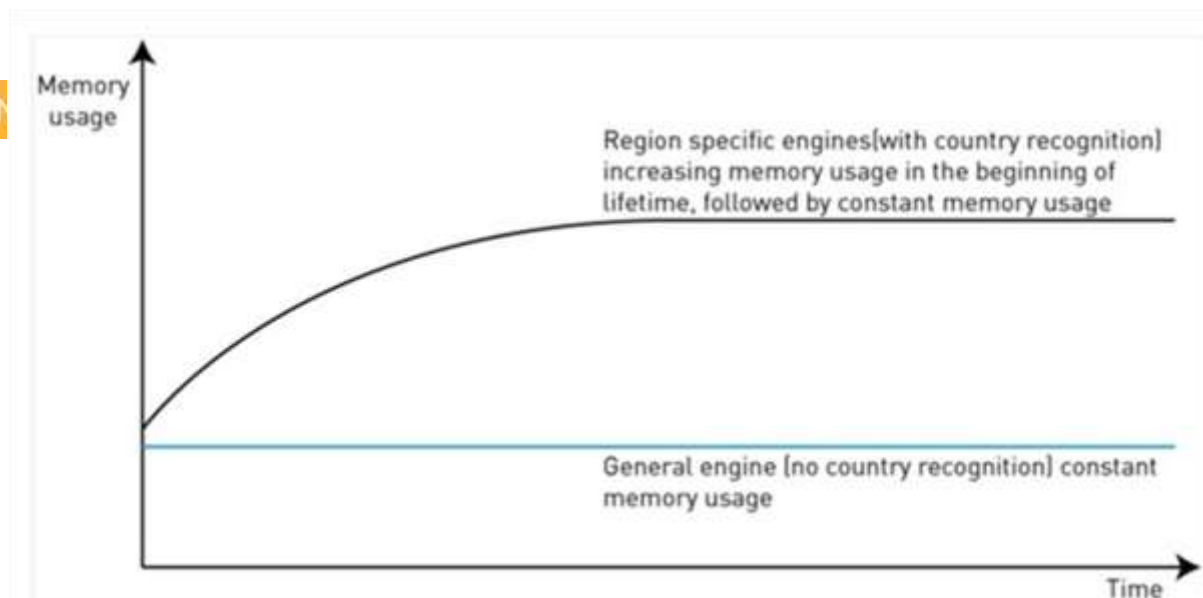
For ADR or EmptyADR reading, values {4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15} should be used.

**Possible values:** {0,1,3,4,5,6,7,8,9,10,11,12,13,14,15}

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** 1

### THE RELATIONSHIP OF MEMORY CONSUMPTION AND TIME IN CARMEN® ENGINES



Region specific CARMEN® engines require more memory than the general engine. Each instance uses around 300MB of memory, you can calculate with 500 MB memory for each one. CARMEN® instances do not share the memory area, so this requirement should be multiplied by the number of instances in a system.

To see what is the connection between [general](#) and [zeroconfincencerresults](#) property, please check [this](#) chapter.

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## 2. TYPEWEIGHT

### PRIORITIZING OR OMITTING LICENSE PLATE TYPES OR COUNTRIES/STATES/PROVINCES

(available from version 7.2.8.46)

CARMEN® engines recognize the country based on the so-called license plate types. Two license plates fall into the same type if they differ only in their texts keeping the syntax, layout, font type, delimiters, and all graphical elements. The above implies that each country/state has several different license plate types. Each type is assigned to an ID, and the ID's are arranged into intervals for easier handling of countries/states. These intervals are defined as follows:

From **ccode\*1000** to **ccode\*1000+999**; where ccode stands for the “country code” or “state code” as listed in chapter “[Country and State IDs](#)”

For example:

The country code of Hungary is 101. The valid Hungarian types are between 101000 and 101999. By default, all types are handled equally by the engine when the type (country/state) is recognized. The engines are usually released for certain regions (continents), which may include several countries/states from a larger area. The more countries/states supported by the engine, the more types it needs to handle. If the site where the engine is used is not at a border-crossing point, 90% of known plate types never occur. In order to give users the possibility to handle this, the engine assigns weight values to each type.

By configuring these, the priority of certain types or countries/states can be changed. This leads to a more specific engine configuration, which can perform more efficiently in that site than the general settings.

The default weight is 1000 for each type. The weight values can be integer numbers from minus 10.000 to positive 10.000.

#### How to enable / disable certain types, countries, or states?

There are two factors of the weight values:

- the absolute value
- and the sign

The absolute value defines the priority of a specific type among the set of all known license plate types. The higher the absolute value, the higher the priority of the type.

The sign defines whether or not the type should be returned by the engine. Negative weights will disable the type, and upon finding, the engine will not return it.

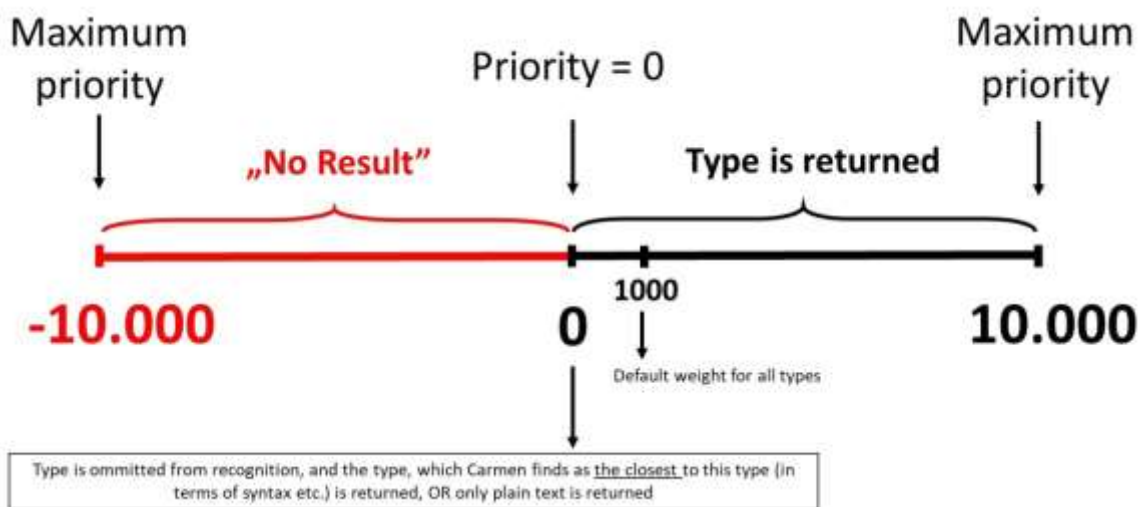
**Possible values:** string

**Default value:** empty string – filtering is disabled; all types are considered with the same weight

**Suggested value:** raise the weight of the desired types, or simply leave the default value to skip this feature

**Weight value range:** -10.000 to 10.000

**Default weight for all type is 1000.**



For example:

Assume that in a certain border crossing point the trucks have two license plates, one from each country. The project requires reading only one type, but the engine is trained for both. In this case, a negative value with high absolute value can disable the unwanted type range and prevent them from being returned.

Weight value examples (after OCR part of the process is finished):

“-10000” to “-1”: type recognized but result is dropped

“0”: omitted from the type set and: matched to closest similar type or plain text returned or no result returned

“1” to “10000” – recognized and returned

### Advantages of using typeweight

In case of regions where there are many different license plate types, the engine has to choose the type of the license plates from a large set, even thousands of different versions. By using typeweight, the engine can be configured to be more specific for a smaller area. This can improve both the accuracy and the processing time.



## Syntax

The string value of typeweight should contain ordered pairs of type (type ranges) and weight values. For example:

typeweight="101,-1000" disables all license plate types of Hungary

typeweight="1,-1000" disables all license plate types of Europe

typeweight="101,-1000;122,-1000" disables all license plates of Hungary and Germany

typeweight="1,500;101,1000" sets the weight of all Hungarian plates to 1000, and decreases the weight of all other European types to 500

typeweight="123,0" omits all Belgian license plate types from the recognition, meaning the plates that seem to appear as Belgian plates are returned matched with the type closest to the Belgian syntax

typeweight="101,5000" increases the weight of all license plate types of Hungary.

### Note

The specified weights are applied one after the other. So in case of typeweight="1,500;101,1000", all European license plates are set with weight of 500, and after that the types of Hungary are set with weight=1000.

## Examples

1. European engine used in Germany, for monitoring and categorizing German vehicles. License plates from foreign countries are not relevant.

For an efficient solution, all countries of Europe should be ignored except for Germany. Solution: set the weight of all European types to -1000 and then set a high positive value for Germany:

```
typeweight="1,-1000;122,1000"
```

2. USA engine used in Florida, the occurrence of vehicles from neighbour states are expected, but license plates from states and even countries that are far away are very rare. Solution: initialize two instances of the engine, and use one of them as default which can detect FL, SC, GA, AL, MS, LA license plates and the other as secondary which can cope with the rare cases.

For the default configuration:

```
typeweight="5,0;550,1000;548,1000;549,1000;530,1000;533,1000;532,100"
```

ignores all USA types except for the above-mentioned states (see state code list)

For the secondary configuration:

```
typeweight="550,0;548,0;549,0;530,0;533,0;532,0"
```

ignores the above covered states and therefore the engine can focus on the others

**Note**

This configuration will ensure higher speed for most of the cases, while the rare license plates can also be detected with a slightly longer extra processing time.

**Relation with [general](#)**

Note that the [general](#) property is also related with enabling/disabling certain types of license plates. By changing typeweight, the engine analyzes the new configuration and changes the value of [general](#) to keep the consistency. Also, by setting [general](#), the weight of certain type ranges will be changed. In practice, to avoid confusion, either [general](#) or [typeweight](#) should be used (**never both**).

**Note**

The function `GetProperty()` can return the current value of the **typeweight** property. By defining a new string for typeweight will reset all previous settings.

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### 3. COLORTYPE

#### COLOR SCHEME ON THE PLATE (BACKGROUND VS CHARACTER COLORS)

Module property to exclusively read plates with either standard color schemes, or inverted color schemes, or both. (Background vs character colors)

- 0: Module searches for all plates in the image regardless of the type of color scheme.
- 1: Module searches for plates only with dark characters on light background.
- 2: Module searches for plates only with light characters on dark background.

**Possible values:** {0,1,2}

**Default value:** 0

**Suggested value:** 0

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## 4. NCHAR\_MAX

### MAXIMUM NUMBER OF CHARACTERS IN THE PLATE

The maximum number of characters in the license plate. The engine does not return plates on which the number of characters is more than the `nchar_max` value **unless** they have an identified type (`cmNP::type > 0`).

**Possible values:** positive integers (bigger than [nchar\\_min](#))

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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## 5. NCHAR\_MIN

### MINIMUM NUMBER OF THE CHARACTERS IN THE PLATE

The minimum number of characters in the license plate. The engine does not return plates on which the number of characters is less than the `nchar_min` value **unless** they have an identified type (`cmNP::type > 0`).

**Possible values:** positive integers (between 0 and [nchar\\_max](#))

**Default value:** varies with each engine release; default property value can be queried by the `GetProperty()` function

**Suggested value:** leave the default value

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# PROPERTIES RELATED TO CUSTOMIZATION OF RESULTS

## 1. GAPTOSPACE

### GAPS BETWEEN CHARACTERS

If this parameter is set to a positive value, the module searches for gaps between characters that can be spaces. Space characters are inserted into these positions in the **text** and **wtext** fields of the result structure. If the value is zero, no spaces will appear in the result.

Meaning of the possible values:

0 – the text is returned in one block (no spaces will appear in the result)

1 – spaces are inserted instead of gaps into **text** and **wtext** members of the **cmNP** structure. The cmAnpr engine calculates the positions of the gaps based on the frames of the characters. If the gap is wide enough, spaces are inserted into **text** and **wtext**

#### Note

In case of plates with both Arabic and corresponding Latin characters [gaptospace=1](#) won't work properly unless the [local\\_character\\_permutation](#) is set to 3.

If only the Arabic or only the Latin character sequences are wanted using [gaptospace=2](#) is suggested instead.

2 – This feature is only available for engine version 7.2.8.6 and higher. In this case, spaces are inserted into the corresponding positions by default. But by the following parameters, the user can define the mode of the return of the text:

symbolnewrow	beginning of a new row
symbollowcharstart	beginning of the small characters
symbollowcharend	end of the small characters
symbolarms	coat of arms
symbolhyphen	hyphen
symbolspace	space
symbolverticalline	vertical line

First, the engine identifies the country/state of the license plate, which defines the layout of characters and symbols. The symbols are then substituted with the ASCII characters specified in the corresponding property as shown in the table above.

The following license plate is a sample, which contains the most possible text positions:



If the gaptospace parameter is set to 0 the returned text will be: AB123DF234GH

- if it is set to 1, the text will be: AB 123 DF 234 GH
- if it is set to 2 the text will be the same, but by the following parameters the returned text can be defined more precisely:

```

symbolnewrow=47
symbolallowcharstart=40
symbolallowcharend=41
symbolarms=42
symbolhyphen=45
symbolverticalline=124
symbolspace=95

```

With these settings the user receives the following text: \*/AB|(1/2/3)DF\_234-GH

Sample gxsd.dat entry:

```

<cmanpr-7.2.8.8>
...
  <gaptospace value="2"/>
  <symbolnewrow value="47"/>
  <symbolallowcharstart value="40"/>
  <symbolallowcharend value="41"/>
  <symbolarms value="42"/>
  <symbolhyphen value="45"/>
  <symbolverticalline value="124"/>
  <symbolspace value="95"/>
...
</cmanpr-7.2.8.8>

```

**Possible values:** {0,1,2}

**Default value:** 0

**Suggested value:** 2 – if the geometry of the license plate needs to appear in the **text** and **wtext**

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## 2. PLATETYPEINFOS

RETRIEVING VARIOUS TYPE OF INFORMATION ABOUT PLATES

(available from engine version 7.3.12.193)

This property enables the user to directly retrieve all kind of information for the recognized images or even for an exact plate type.

These are the information which can be get currently:

- countryname (same as the already existed [countryname](#) property result: „US-TX“)
- CountryS (Country Short, official 3 letter ISO code: „USA“)
- CountryL (Country Long, the full name of the country: „United States Of America“)
- StateS (State Short: „TEX“)
- StateL (State Long: „Texas“)
- category (License Plate category: „TAXI“)

### HOW TO USE THIS PROPERTY

- `GetProperty("platetypeinfos_informationname")` – in this case you will get back the information for the type of the last result
- `GetProperty("platetypeinfos_typevalue_informationname")` – in this case you will get back the information for an exact type

Examples:

- `GetProperty("platetypeinfos_category")`
- `GetProperty("platetypeinfos_StateL")`
- `GetProperty("platetypeinfos_212147_category")` -> The result will be „TAXI“

Possible outcom of the requests:

Result	Meaning
„No type result“	Type was not given back by the engine
„Invalid type“	Type does not exist
„Valid type, no info“	Type is valid, but the requested info is not available yet
Valid result	Type is valid and the information is available

### HOW TO MODIFY THIS PROPERTY

It is possible to personalize the information if you would like to see something else than the default values. You can do it with the following command:

`SetProperty("platetypeinfos_informationname_originalname", „newname“).`

Example:

`SetProperty("platetypeinfos_category_TAXI", "CAB")` -> after this command if the category would be „TAXI“ then the engine will give back the result as „CAB“

If you would like to set them back, you can do it one by one with the above command, or there is an option to set back all the default values at once:

`SetProperty("platetypeinfos", "default").`

## Possible values of the category information:

0	– NONE – we don't know yet
1	– COMMON
2	– CUSTOM
4	– TAXI
8	– DIPLOMATIC
16	– EXPORT
32	– OLD_TIMER
64	– MOTORCYCLE
128	– PUBLIC_TRANSPORT
256	– COMMERCIAL
512	– POLICE
1024	– GOVERNMENT
2048	– PROBATION
4096	– DRIVING_SCHOOL
8192	– TRAILER
16384	– ARMY
32768	– CONSULAR
65536	– EQUIPMENT
131072	– SECURITY_FORCES
262144	– PRIVATE_TRANSPORT
524288	– UNDER_EXPERIMENT
1048576	– EMIRI_GUARDS
2097152	– UN
4194304	– LIMOUSINE
8388608	– TEMP_TRANSIT

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The combination of the categories are their sum.

Example: Police Motorcycle: 576 (512 + 64).

Binary:

Police: 000000001000000 = 64

Motorcycle: 000001000000000 = 512

Police Motorcycle: 000001001000000 = 576

### 3. AUTOTYPEMODIFICATION

This parameter allows the state recognition purely by plate text (only available in the engines which contains Mexico – CAM, NAM). The regions are determined by the predefined range of plate types. This overrules the recognised region if any.

*Possible values:* {0,1}

*Default value:* 1

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### 4. CONVERTOTO0

If this parameter is set to “1” all 0 (zeros) will be converted to “O” – only in case of general engine where no syntax check is available.

*Possible values:* {0,1}

*Default value:* 0

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## 5. COUNTRYNAME

### RETRIEVING COUNTRY/STATE NAMES DIRECTLY

(available from engine version 7.3.9.71)

This property enables the user to directly retrieve country and state information from the recognized images.

**Possible values:** string

**Default value:** „default” – returns the country information in the form of country codes listed in [Appendix](#).

**Suggested value:** „default”

Engine versions 7.3.9.70 and earlier, (including all versions 7.2.8.x and 7.2.7.x), returned the country and state information encoded in the type field of the cmNP structure. A full description on country and state information retrieval in earlier engine versions can be found in the [Retrieving country names from returned plate type values](#) section. \_

From version 7.3.9.71, the engine can return the country or state code itself.

The engine will, in the majority of cases, return either an ISO 3166-1 alpha-3 or a 3166-2 code. However, there are some countries and/or regions that the engine can recognize but are not present in the official ISO registry and therefore have no official ISO codes. In these cases, easily identifiable but non-official ISO codes were used. For the complete country code table please see [Appendix](#).

The countryname property can be used to:

- Retrieve country codes.
- Customize country codes.
- Retrieve country codes with type values.

## 1. RETRIEVING COUNTRY CODES

After successfully processing an image (if a previous call of `cmAnpr.FindFirst` or `cmAnpr.FindNext` returned true), the value of this property will contain the country that issued the recognized license plate.

For example:

```
if (cmAnpr.FindFirst(image))
{ string country = cmAnpr.GetProperty(„countryname“); }
```

The string „country“ will contain the code of the country as listed in [Appendix](#).

## 2. CUSTOMIZING AND RESETTING:

Before calling `cmAnpr.FindFirst`, set the substitution text to a certain country ID by creating a new property name: „countryname\_“+country\_ID, where country\_ID can be anything from the „*Country – State (CountryName)*“ column of the table in [Appendix](#).

```
cmAnpr.SetProperty(„countryname_US-TX“, „TEXAS“);
```

After this call, in all cases when the recognized plate is from Texas, the engine will return `country=“TEXAS”` instead of `country=“US-TX”`.

To reset every previously set custom country name, call:

```
cmAnpr.SetProperty(„countryname“, „default“);
```

### 3. RETRIEVING COUNTRY CODES FROM TYPE VALUES

With the help of this property it is also possible to retrieve the country code of a certain license plate type if only the information returned in the type field of a cmNP data structure is given.

Suppose that a license plate has the following type value,101112, but you do not know what country it represents. In this case it is possible to feed this value to the engine and it will return the country code:

```
string country = cmAnpr.GetProperty(„countryname_101112”);
```

After this call, the engine will return that the country=“HUN”

#### Note

This call is independent from FindFirst and FindNext.

If the specified number does not represent a possible license plate type, the `GetProperty()` call above will return „Invalid type”.

#### Note

Another direct retrieval of Country and State text is also available in the SDK through the “`cm_getcountrycode()`.” function and “CC\_TYPE enumeration.”. For more information: please see the SDK Programmers Manual.

## 6. CYRILLIC\_STYLE

Successor of this property is [local\\_character\\_conversion](#).

This parameter allows the user to show the results in Cyrillic characters. In case of 1, the engine will return the Russian plates in Cyrillic format.

*Possible values:* {0,1}

*Default value:* 0

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## 7. LOCAL\_CHARACTER\_MODIFICATION

### 7.1. LOCAL\_CHARACTER\_CONVERSION

This parameter allows the user to show the results in local language characters.

- 0 – The engine will decide which character sequence to return as a default
- 1 – the engine will return the Russian plates in Cyrillic format
- 2 – the engine will return the Nepali plate results in Nepali characters
- 3 – (1+2) – both Nepali and Russian plates shown in local language characters

**Possible values:** {0,1,2,3}

**Default value:** 0 (except Nepali engine, where it is 2)

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### 7.2 LOCAL\_CHARACTER\_PERMUTATION

(available from engine version 7.3.13.33)

This parameter allows the user to change the behaviour of the engine in case of character sequence pairs: Arabic character sequences with their Latin pairs also present on the plate. Characters without a pair will be returned normally.

- 0 – The engine will decide which character sequence to return for every Arabic - Latin character sequence pair on the plate.
- 1 – Arabic to Latin: the engine will return the Latin character sequence for every Arabic - Latin character sequence pair on the plate.
- 2 – Latin to Arabic: the engine will return the Arabic character sequence for every Arabic - Latin character sequence pair on the plate.
- 3 – all characters: the engine will return both character sequences for every Arabic - Latin character sequence pair on the plate.

**Possible values:** {0, 1,2,3}

**Default value:** 0

#### Note

Should you set this parameter to 0, 1 or 2 we strongly suggest **not to set** the [gaptospace](#) parameter to 1. It won't function properly on plates with Arabic - Latin character sequence pairs. Using [gaptospace](#) = 2 is preferred in this case.

**Note**

Using this parameter is preferred instead of setting the [unicode\\_in\\_text](#) parameter to 2. (If the [unicode\\_in\\_text](#) is set to 2 the engine tries to "translate" the Arabic characters to Latin characters but the translation is often imprecise or even impossible.)

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## 8. UNICODE\_IN\_TEXT

Representation of the non-ASCII characters in the text parameter of the cmNP structure.

Meaning of the possible values:

0 – The non-ASCII characters are replaced with an exclamation mark (!)

1 – Each non-ASCII character is represented with 6 ASCII characters: '(xxxx)', where xxxx is the Unicode code of the character in hexadecimal form including the leading zeros

2 – Each non-ASCII Arabic character is represented with the corresponding Latin character

**Note**

This will give a rough translation. If both the Arabic and the corresponding Latin characters are present on the plate using the [local\\_character\\_permutation](#) parameter is suggested instead.

*Possible values:* {0,1,2}

*Default value:* 1

*Suggested value:* 1

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# PROPERTIES RELATED TO COLOR RECOGNITION

## 1. ANALYZECOLORS

### COLOR RECOGNITION MODE

This property selects the color recognition mode for license plates, but only when the plate color is an additional distinguishing feature that carries extra information. Meaning of the possible values:

0 – Color identification is disabled

1 – cmAnpr engine returns discrete color values – see table below. During processing, the engine reads exact BGR values, and the statistically most probable results are given.

#### Note

Due to statistical reasons, results based on discrete values may be incorrect in case of plates with previously “unseen” colors (e.g. blue plates will not be identified if there were only red and orange ones available when the cmAnpr engine was released).

2 – cmAnpr engine returns the exact BGR (Blue, Green, Red) values read (further processing may be required by the user in order to define the exact color)

3 – (not available value)

4 – In case of certain contemporary Saudi Arabian plates, where the band color is also marked with a symbol (circle, or isosceles triangle pointing to various directions), a discrete color value is returned according to the marker symbol.

5 – Both color identification and symbol reading are applied to recognize color. Discrete color values are returned such as in case of value 1.

6-7 (not available values)

8 – Color identification based purely on plate text color indication (currently only in case of Thailand plates)

9 – Color identification based on both plate text color indication and exact color recognition (currently only in case of Thailand plates)

The cmAnpr engine is capable of recognizing the color of a license plate only when the following requirements are fulfilled:

- the country/state recognition feature must be enabled (`depth > 0`)

#### Note

We are using BGR (Blue,Green,Red) values everywhere, except in our Demo applications (ADI, ADV), where RGB is in use.

**Note**

Set an adequate [timeout](#) value according to instructions in the [timeout](#) section above, which will allow full processing of the country/state recognition.

- the engine must correctly identify the country/state since the layout defines the location of the color area
- the `analyzecolors` property has to be set to {1,2,4,5,8,9}

**Note**

The color recognition feature is defined only for the values listed above. When setting values 4 or 5, color information may be returned from grayscale images as well for the contemporary plate types of Saudi Arabia.

Color codes and names

Color	BGR Code	Decimal (returned value)
White	0xFFFFFFFF	16777215
Black	0x000000	0
Blue	0xFF0000	16711680
Cyan	0xFFFF00	16776960
Green	0x00FF00	65280
Orange	0x0080FF	33023
Yellow	0x00FFFF	65535
Red	0x0000FF	255

**Possible values:** {0,1,2,4,5,8,9}

**Default value:** 0

**Suggested value:** 5 – in case color recognition is required, otherwise leave the default value

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## 2. WHITEBALANCE

### WHITE BALANCE CORRECTION

When applying color recognition, the white balance is set automatically by the engine. In some special cases (e.g. special camera settings, extreme weather or light conditions) the returned colors may not be correct. To avoid misrecognition of colors the **whitebalance** property can be used.

- If it is set to 0 then white balance correction is not used.
- If it is set to 100 then maximal white balance correction is applied

24/7 use of white balance correction can also be applied. Incorrect results may return only when the camera is used in very different environmental conditions in a very short time (e.g. the camera is used at night with **whitebalance 100**, turned off and then turned on in the morning with the same settings).

**Possible values:** [0..100]

**Default value:** 100

**Suggested value:** 100

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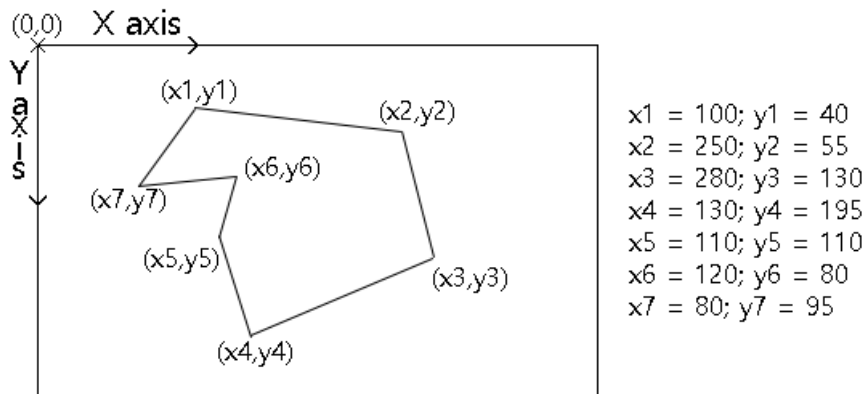
# PROPERTIES RELATED TO THE POSITION OF LICENSE PLATES IN INPUT IMAGES

How to define a polygon

For the below properties we are using polygons as follows:

One Polygon is:  $P = x_1, y_1; x_2, y_2; x_3, y_3; \dots; x_i, y_i; \dots; x_n, y_n$

Where  $(x_i, y_i)$  means one point on a picture in axis parallel coordinate system. The origo  $(0,0)$  is the top left corner. On the X axis the values are increasing rightwards, on the Y axis the values are increasing downwards. You have to set the polygon points clockwise.



## 1. POSFREQ POSITION FREQUENCY

By using the position frequency, certain areas can be specified for the ANPR engine, which are more superior to the others.

With the following parameters, the ANPR algorithm can be set to search for license plates on specific parts of the image. Moreover, some parts can be differentiated according to probability of the license plate occurrence. The essence of the method is that the image is divided into equal zones and each zone is provided with a weight.

The correct value assignment of the weight increases the effectiveness of the searching process. Giving a larger weight of the appointed zone increases the probability of finding the plate and decreases the plate reading time.

The weight assignment is possible in three ways:

- by **uniform distribution**: the weight of each zone will be the same positive number,
- **defining zones**: zones can be defined by the user,
- **defining a polygon**: the polygon should contain all the plates to be read.

The weights may be calculated in a self-adaptive way, as well. In this case, the engine calculates the weights by itself based on the incoming images: each found plate increases the weight of that zone which contains the plate.

The property contains a string of characters. It consists of numbers separated by ',' and ';', where ',' separates the numbers and the ';' stands for the line wrap.

If the string is empty, it initializes the grid with uniform distribution (the weight of each zone will be the same positive number). If there are exactly two numbers and at least three number pairs (two columns and three rows), the string defines a polygon. Otherwise, it defines zones, where the given numbers represent the starting weights of each zone.

The data is invalid if the rows are not the same length or if there are less than two columns, or less than three rows.

Zero-weight zones are omitted from the search for license plates. However, the engine will provide results even for plates partially located in a zero-weight zone, if the other parts of the license plate can be found in a non-zero weight zone.

For example:

**Defining zones:**

<posfreq value="1,1,1;4,9,4;1,1,1"/>

The image is divided into 3x3 zone with the given starting weights.

1	1	1
4	9	4
1	1	1

Please check the following sample image, which indicates superior areas in the center of the image:



<posfreq value="0,0,0,0;0,4,4,1;0,9,9,1;0,4,4,1;0,0,0,0"/>

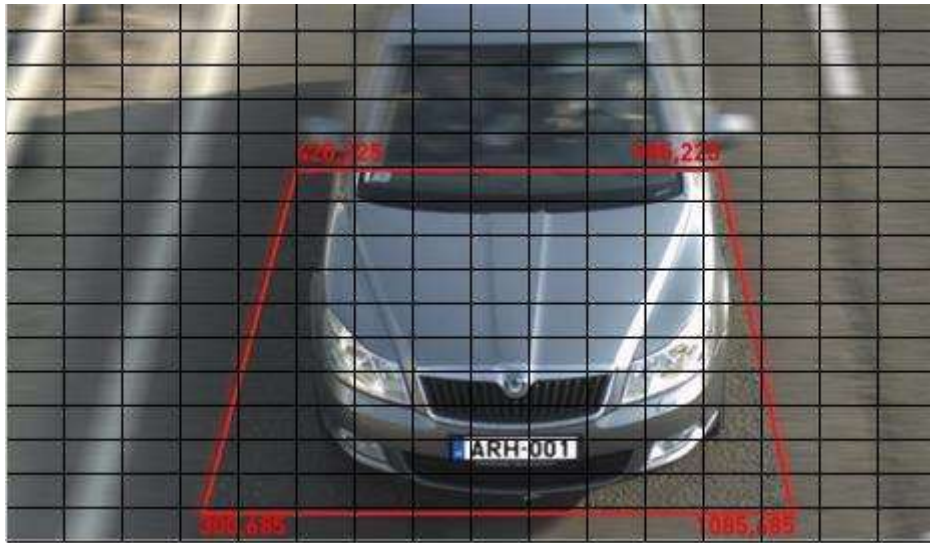
#### Defining a polygon:

<posfreq value="420,225;985,225;1085,685;300,685">

#### Note

The order of the coordinates has to be set clockwise (see below). A polygon is designated in the center of the image, on the score of which the algorithm produces the zones (posfreqhistxs\*posfreqhistys is the number of zones, 16\*16 by default) in such a way that the starting weight of the zones – contained by the polygon – will be maximal. The weight of the zones intersected by the polygon will be lower in proportion to the intersection. Finally, the weight of the outer (untouched by the polygon) zones will be 0. It does not return any character from the zones with 0 weight.

Example for a polygon posfreq setting:



*Possible usage of posfreq polygon*

*(points are represented in pixel coordinates on the 16x16 default grid)*

- Possible values:** character string
- Default value:** "" (empty string)
- Suggested value:** leave the default value
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## 2. ROI/ROU

REGION OF INTEREST / REGION OF UNINTEREST  
(available from version 7.3.11.189)

Please check how to [define a polygon](#) at the beginning of this section.

### 2.1. ROI

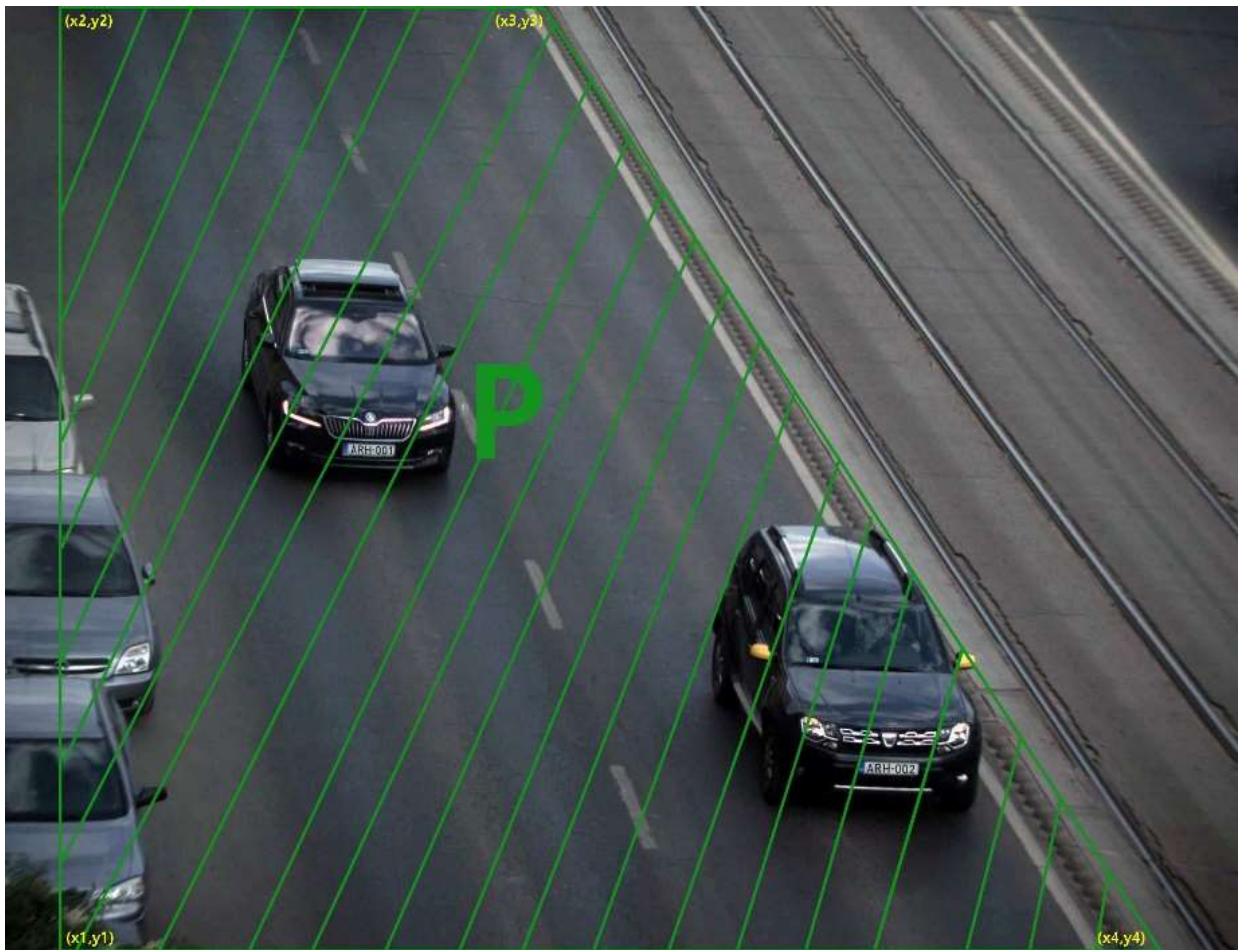
REGION OF INTEREST

Please check how to [define a polygon](#) at the beginning of this section.

You can set with this property, the polygon(s) where CARMEN® should search for the license plates.

Usage:

- P: CARMEN® will search the LP inside the polygon (delete the previous ROI settings)
- P1 + P2 + ... + Pn: set more polygons at the same time (delete the previous ROI settings)
- +P: add one more polygon to the existing ones, it will NOT delete the previous settings
- del: delete the previous ROI settings



This parameter can be set, get, its values saved into gxsd.dat, and it's readable from there. If you set ROI only then CARMEN® will search the LP only inside the ROI.



## 2.2. ROU

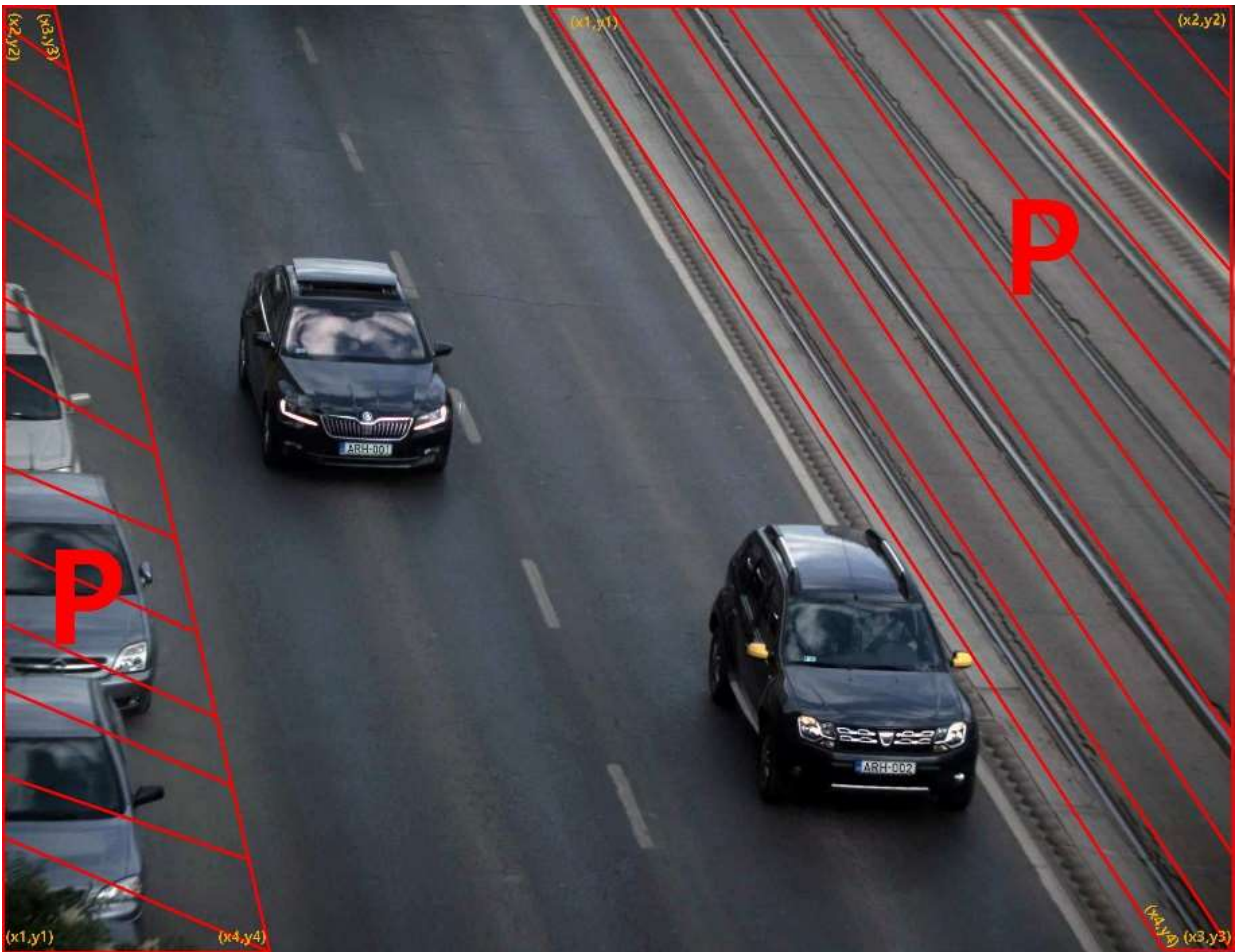
### REGION OF UNINTEREST

Please check how to [define a polygon](#) at the beginning of this section.

You can set with this property the polygon(s) where CARMEN® shouldn't search for the license plates.

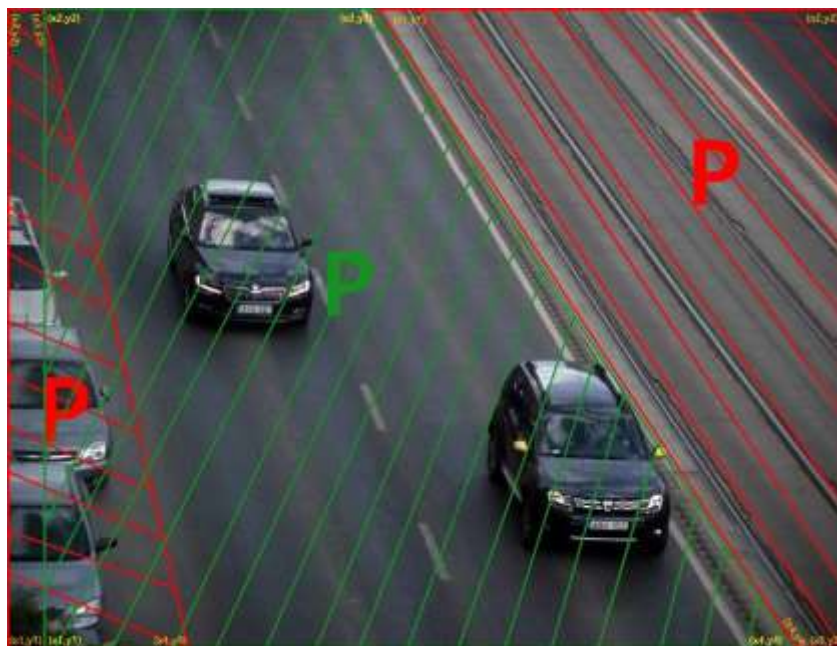
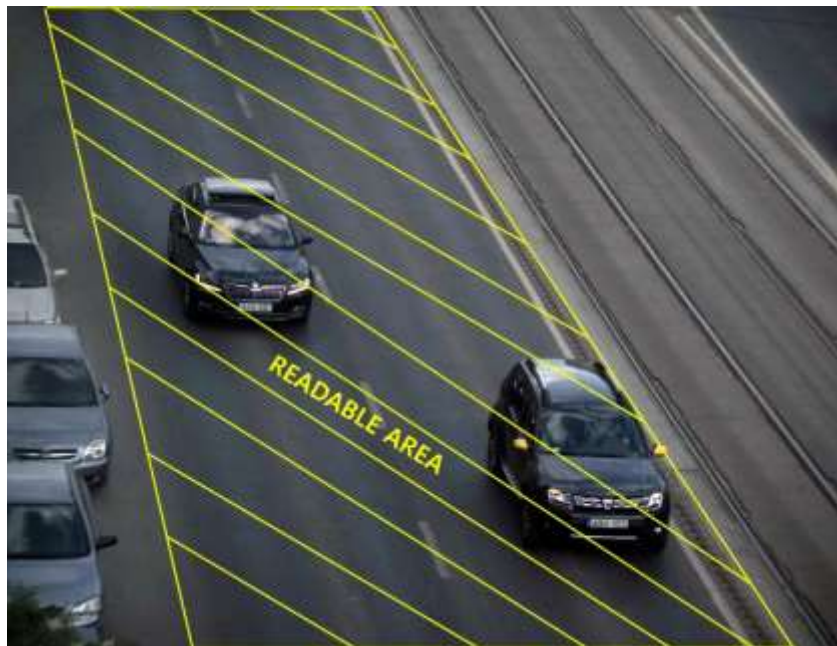
Usage:

- P: CARMEN® will NOT search the LP inside the polygon
- P1 + P2 + ... + Pn: set more polygons at the same time (delete the previous ROU settings)
- +P: add one more polygon to the existing ones, it will NOT delete the previous settings
- *del*: delete the previous ROU settings



This parameter can be set, get, its values saved into gxsd.dat, and it's readable from there. If you set ROU only then CARMEN® will search LP outside ROU.

If you set ROI and ROU as well then CARMEN® will search LP only inside ROI where there is no ROU, so ROU is the stronger condition.



#### Note

If you set [posfreq](#) as a polygon then it will delete the ROI and ROU and overwrite the ROI with the [posfreq](#) polygon.

#### Note

We strongly suggest not to use the [posfreq](#) and the ROI/ROU parameters simultaneously to avoid future difficulties.

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### 3. POSFREQHALFLIFE

#### LEVEL OF WEIGHT ADAPTATION

If its value is 0, the weights will not be adapted (it does not learn from the previous cases). It will use the original settings all the time.

Otherwise, after 'posfreqhalflife' number of evaluations, the starting information will be half lapsed and the new information will be half freshened.

Half-life: after the evaluation of so many images, the total weight of the histogram will be twice as much.

*Possible values:* [0..1048576]

*Default value:* 0

*Suggested value:* 0

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### 4. POSFREQHISTXS

#### HORIZONTAL RESOLUTION FOR DEFINING POSITION FREQUENCY

In case of setting a polygon or zones, the number of columns can be set by this property.

*Possible values:* [2..64]

*Default value:* 16

*Suggested value:* 16

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### 5. POSFREQHISTYS

#### VERTICAL RESOLUTION FOR DEFINING POSITION FREQUENCY

In case of setting a polygon or zones, the number of rows can be set by this property.

*Possible values:* [2..64]

*Default value:* 16

*Suggested value:* 16

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## 6. POSFREQWEIGHT

### WEIGHT FOR THE POSITION OF THE LICENSE PLATES

This parameter defines the extent the system has to take into account the position of the license plates.

If this parameter is 0, the system does not distinguish between the non-0 weight zones. In this case, the searching does not exploit the distribution of the position of license plates.

If this parameter is 100, the system tries to exploit maximally the distribution of the position of license plates.

*Possible values:* [0..100]

*Default value:* 50

*Suggested value:* 50

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# PROPERTIES RELATED TO IMAGE QUALITY

## 1. GAMMA

### TURNING ON/OFF GAMMA CORRECTION ON INPUT IMAGES

(available from version 7.2.7.87)

This property provides the option to apply gamma correction, which makes input images brighter.

Meaning of the possible values:

- 0: Gamma correction is disabled.
- 1: Gamma correction is applied with the standard correction value of 2.2, which can result in better recognition rates in case of images with lower contrast.



Image without gamma correction



Image with gamma correction

**Possible values:** {0,1}

**Default value:** 0

**Suggested value:** 0 – image quality issues should be resolved in the camera

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# PROPERTIES RELATED TO THE CALCULATION OF THE CONFIDENCE LEVEL

## 1. CONFIDENCEMODE

CALCULATION OF PLATE CONFIDENCE, (SUCCESSOR OF PLATECONF)

(available from version 7.2.8.41 – Confidence modes 8-15 are available from 7.3.10.204)

Unlike [plateconf](#), [confidencemode](#) has several options to fine-tune the calculation method of the returned overall confidence level. From version 7.2.8.41, use this property instead of [plateconf](#). The possible values and their meanings are listed in the table on the next page.

The confidence level can be calculated in several ways but we can choose from two basic principles:

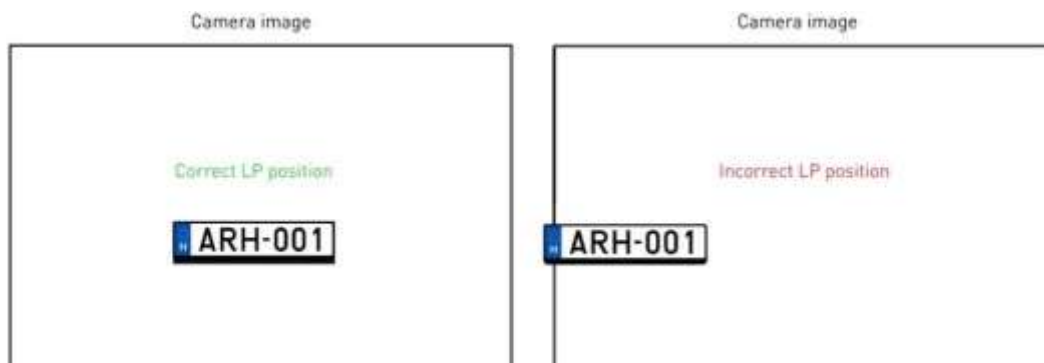
1) Having the product of the factor(s), (text, type and position), as the final confidence level. (Confidence modes 0-7)

OR

2) Having the arithmetic mean, (average), of the factor(s) as the final confidence. (Confidence modes 8-15)

3) The latter will show a higher confidence rate (for the same reading) but will be less scalable.

4) The following image demonstrates the required license plate position on the camera image:



Meaning of the possible values:

confidencemode	Formula for the returned confidence				Equivalent to plateconf value	Comments
	Factors			Formula		
	Text confidence	Type confidence	Position confidence			
0	100			Constant	-	Confidence level calculation is disabled, the engine will always return 100 as overall confidence
1	Qtext			$\prod Q_{C_n}$	0	The text confidence will be returned by multiplying each character's confidence
2		Qtype		Qtype	-	The type confidence will be returned
3	Qtext	Qtype		Qtext * Qtype	1	The product of the text confidence and the type confidence will be returned
4			Qpos	Qpos	-	The position confidence will be returned
5	Qtext		Qpos	Qtext * Qpos	-	The product of the text confidence and the position confidence will be returned
6		Qtype	Qpos	Qtype * Qpos	-	the product of the position confidence and the type confidence will be returned
7	Qtext	Qtype	Qpos	Qtext * Qtype * Qpos	2	The product of the position confidence, the type confidence and the text confidence will be returned

confidencemode	Formula for the returned confidence				Equivalent to plateconf value	Comments
	Factors			Formula		
	Text confidence	Type confidence	Position confidence			
8	100			Constant	-	The engine will always return 100 as overall confidence
9	Qtext			$\overline{Qtext}$	-	The text confidence will be returned by taking the arithmetic mean (average) of the character's confidence
10		Qtype		Qtype	-	The type confidence will be returned
11	Qtext	Qtype		$\frac{(\overline{Qtext} + Qtype)}{2}$	-	The arithmetic mean (average) of the text confidence and the type confidence will be returned
12			Qpos	Qpos	-	The position confidence will be returned
13	Qtext		Qpos	$\frac{(\overline{Qtext} + Qpos)}{2}$	-	The arithmetic mean (average) of the text confidence and the position confidence will be returned
14		Qtype	Qpos	$\frac{(Qtype + Qpos)}{2}$	-	The arithmetic mean (average) of the position confidence and the type confidence will be returned
15	Qtext	Qtype	Qpos	$\frac{(\overline{Qtext} + Qtype + Qpos)}{3}$	-	The arithmetic mean (average) of the position confidence, the type confidence and the text confidence will be returned

For more information on the above calculation, see the appendix [Confidence Level Calculation](#).

*Possible values:* {0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15}

*Default value:* 7

*Suggested value:* 7

#### Note

If you set [posfreq](#) and [confidencemode](#) as well, then that one will take affect which you set later and it is possible that it may overwrite the other value.

For example:

- If confidencemode is set to 4 and later you set plateconf to 2, then confidencemode will be overwritten to 7
- If plateconf is set to 1 and later you set confidencemode to 12, then confidencemode will take affect and plateconf will not be changed

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## 1.1. CONFIDENCEMODE\_X

(available from version 7.3.12.5)

After a successful ANPR you can get additional confidence results. You have to replace „X” with the appropriate number (0 - 15) from the above table. For example, `confidencemode_5` will provide you the text confidence and the position confidence multiplied together.

You can only get this property; it is not possible to set it!

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## 2. PLATECONF

CALCULATION OF THE PLATE CONFIDENCE

(available from version 7.2.7.106)

Successor of this property is [confidencemode](#).

In case of `plateconf = 0` the text confidence ( $Q_{\text{text}}$ ) will be returned.

In case of `plateconf = 1` text and type confidence ( $Q_{\text{type}} * Q_{\text{text}}$ ) will be returned.

In case of `plateconf = 2` the overall confidence ( $Q_{\text{pos}} * Q_{\text{type}} * Q_{\text{text}}$ ) will be returned.

For more information on the above calculation, see the appendix [Confidence Level Calculation](#)

**Possible values:** {0,1,2}

**Default value:** 2

**Suggested value:** 2 - Please use the successor parameter: [confidencemode](#).

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### Note

If you set [posfreq](#) and [confidencemode](#) as well, then that one will take affect which you set later and it is possible that it may overwrite the other value.

For example:

- If `confidencemode` is set to 4 and later you set `plateconf` to 2, then `confidencemode` will be overwritten to 7
- If `plateconf` is set to 1 and later you set `confidencemode` to 12, then `confidencemode` will take affect and `plateconf` will not be changed

### 3. ZEROCONFIDENCERESULTS

#### ENABLE ALL RESULTS

In case of dual or 2 level engines, you can turn on this feature to enable all results in case of very **low false positive rate** engines.

For example - **FRQFPO** or **PSTFPO** two-step engines:

value 0 – no result in case of unknown type or text

value 1 – the engine will provide a result (text and type) with 0 confidence value

- you can accept all results (higher than 0 confidence level) to still get the super low false positive results
- and send all 0 confidence level results to manual review or to level 2 engine

*Possible values:* {0,1}

*Default value:* 0

To see what is the connection between [general](#) and [zeroconfidenceresults](#) property, please check [this](#) chapter.

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# PROPERTIES RELATED TO MEMORY HANDLING

## 1. HEAPFREEFREQ

During the run of an engine, it reserves some memory resource for itself. It can happen that for a large image it reserves a bigger amount of memory (this is a normal behaviour). This may remain reserved for CARMEN® even if later it uses only smaller amount of the memory.

You are able to free up the memory which is allocated to CARMEN® with this property. If you set this property to 30 then it means after every 30 `FindFirst()` calls, it will free up the memory. We suggest you to use this property if you have 2 GB memory or less.

*Possible values:* {0, every positive integer}

*Default value:* 0

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# PROPERTIES RELATED TO MAKE AND MODEL RECOGNITION (MMR)

(minimal ANPR engine version for MMR: 7.3.11.164 – MMR will not work with lower versions)

The CARMEN ANPR products from version v7.3.1.21 are equipped with the new Make and Model Recognition (MMR) feature.

If the CARMEN system contains a typed (not the general) CARMEN engine and an MMR engine (mmr-x.x.x.x.dll on Windows or mmr-x.x.x.x.so on Linux), the CMANPR module can recognize make, model, category and the color of the vehicles.

## Note

MMR engines need separate MMR licenses and has to be the same region as ANPR license to be able to work together. GEN MMR engine can work with every ANPR engines (except GEN ANPR engine, which is not capable to run with any MMR engine)

The CMANPR module can get the MMR information in two ways: auto and manual.

Using the **auto mode** the CMANPR module generate MMR information after every number plate reading (FindFirst, FindNext).

This mode is recommended if you want to recognize every single image (e.g. each image from a video/image sequence, or from multiple standalone images).

The **manual mode** is useful if you have many images or image sequences (e.g. Highway events or video) and you can define the exact image(s) from which the MMR should create a result. In this case you can get MMR information only from the best image of the sequence.

To get the results use the getMMR function of the CMANPR module. You need the image and the number plate reading result (cmNP structure) to call getMMR function.

In both cases (auto and manual) you can get the MMR result trough the properties below.

## Available property names to get the MMR result

**NOTE: All properties are read only!**

- **mmr/mm/make**: the 'make' from the make&model of the recognized vehicle.
- **mmr/mm/model**: the 'model' from the make&model of the recognized vehicle.
- **mmr/mm/submodel**: the 'sub model' from the make&model of the recognized vehicle.
- **mmr/mm/fullmm**: the 'make model submodel' from the make&model of the recognized vehicle.
- **mmr/mm/conf**: the confidence of the 'make&model' recognition.
- **mmr/category**: the 'category' of the recognized vehicle. Three characters code.

### Known categories (full name):

- - unk (unknown)
- - bus (bus)
- - car (car)
- - hvt (heavy truck)
- - lgt (light truck)
- - van (van)

- **mmr/category/fullname**: the full name of the category
- **mmr/category/conf**: the confidence of the 'category' recognition.
- **mmr/color/code**: the 'color' code of the recognized vehicle.
- **mmr/color/name**: the 'color name' of the recognized vehicle.

Known colors names:

- black
  - brown
  - blue
  - purple
  - red
  - green
  - orange
  - yellow
  - gray
  - white
- **mmr/color/conf**: the confidence of the 'color' recognition.
  - **mmr/time**: the time of the last MMR recognition in msec.

New properties for the CARMEN ANPR products from version v7.3.1.21 (regarding ANPR and MMR engines):

**NOTE: All properties are read only except 'anpr/fullname', 'mmr/fullname' and 'mmrmode'!**

**anpr/fullname**: The name of the actual (current) ANPR engine. Same as the anprname property.

**anpr/module**: The name of the actual (current) ANPR engine's module (cmanpr-x.x.x.x.dll or cmanpr-x.x.x.x.so).

**anpr/region**: The name of the actual (current) ANPR engine's region (property group from the full name, the string after ':').

**anpr/status/code**: The status value of the actual ANPR engine.

Available status values:

- 0 (no status): No status info
- 1 (valid): The ANPR engine is valid and there is a license for the engine
- 1 (no engine): The default ANPR engine isn't defined
- 2 (invalid) : 'anprname' or 'anpr/fullname' property defines an invalid ANPR engine
- 3 (no license) : The ANPR engine is valid but there is no license for the engine

**anpr/status/msg**: The ANPR engine status information in string format.

**anpr/supportmmr**: 1 if the ANPR engine supports the MMR feature.

**mmr/fullname:** The name of the actual (current) MMR engine. It can be altered during runtime. Its value can be set according to the following: **MMR engine module name : property group**. If there is no specified property group then the cmanpr module handles it as 'default'.

**mmr/module:** The name of the actual (current) MMR engine's module (mmr-x.x.x.x.dll or mmr-x.x.x.x.so) .

**mmr/region:** The name of the actual (current) MMR engine's region (property group from the full name, the string after ':').

**mmr/status/code:** Status value of the actual MMR engine.

**Available status values:**

0 (no status): No status info

1 (valid): The MMR engine is valid and there is a license for the engine

-1 (no engine): The default MMR engine isn't defined

-2 (invalid) : 'mmr/fullname' property defines an invalid MMR engine

-3 (no license) : The MMR engine is valid but there is no license for the engine

**mmr/status/msg:** The MMR engine status information in string format.

**mmrmode** - Set the MMR mode (default value: 0)

**Available modes:**

0 (off) : no MMR recognizing

1 (auto) : automatic MMR recognizing every `FindFirst()` call

2 (manual) : MMR recognizing by calling the `cm_getmmr` (getMMR) function

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# APPENDICES

## CONFIDENCE LEVEL CALCULATION DETAILS AND EXAMPLE

CARMEN® engines return a confidence level value for each result. This confidence level is always an integer from 0 to 100 and is a measure of the correctness of the result. In other words, it represents how sure the engine is that the result is correct. Higher confidence level means a more reliable result. It is important to mention that even if the confidence level is low, the result can be correct.

### Note

The confidence level has no correspondence with the recognition rate. The confidence level is always related to one individual OCR result, (either a single character, or a complete license plate, etc.), while the recognition rate, (the percentage of the license plates that are read correctly,) is always related to a set of images and a reference result set.

CARMEN® calculates separate confidence levels for each subtask of the license plate recognition.

These are:

- $q_i$  confidence of the  $i$ th character (*values 0 to 100*)
- $Q_{\text{text}}$  Where  $Q_{\text{text}} = \text{prod}(q_i), i=1, \dots, n$  **OR**  $Q_{\text{text}} = \text{avg}(q_i), i=1, \dots, n$
- $Q_{\text{type}}$  confidence of the country/state recognition
- $Q_{\text{pos}}$  confidence of the plate position in the image – if it is at the edge of the image, then there is a chance for missing characters
- $Q_{\text{all}}$  overall confidence level for the whole license plate – derived from the above

Derive overall confidence level from the separate confidence levels.

### Example:

Consider a 6-character license plate with a “C” that is physically damaged (e.g. because of a screw). The recognition of this character is less reliable than of any others, and this weak point should reflect in the overall text confidence.

The formula for calculating the overall confidence level using all possible factors

(*confidencemode=7*):


$$Q_{\text{all}} = Q_{\text{text}} * Q_{\text{type}} * Q_{\text{pos}}$$

See also [confidencemode](#), [plateconf](#).

# SAMPLE CALCULATION

(CONFIDENCE MODE=7)

returned values



	returned values					
code	A	R	H	0	0	1
confidence	100	99	99	98	99	99
ncharacter	6					

	returned values
text	ARH001 (in ASCII string format)
wtext	ARH001 (in Unicode string format)
type	111 (defines Hungarian EU standard plate)
confidence	90

Text confidence:

$$Q_{\text{text}} = \prod_{i=1}^n q_i$$

$$\prod_{i=1}^n q_i = q_1 * q_2 * q_3 * q_4 * q_5 * q_6 \text{ -- (} q_i \text{ values represent the confidence of the plate characters)}$$

Since these values represent percentages, each q value has to be divided by 100:

$$= (q_1/100) * (q_2/100) * (q_3/100) * (q_4/100) * (q_5/100) * (q_6/100)$$

$$= (100/100) * (99/100) * (99/100) * (98/100) * (99/100) * (99/100)$$

So:  $\prod_{i=1}^n q_i = 94$

$Q_{\text{text}} \approx 94\%$

Overall confidence of the returned plate type

$Q_{\text{all}} = Q_{\text{type}} * Q_{\text{pos}} * Q_{\text{text}} = 90$  ('confidence' value above)

$$Q_{\text{type}} * Q_{\text{pos}} = \frac{Q_{\text{all}}}{\prod_{i=1}^n q_i} = \frac{Q_{\text{all}}}{Q_{\text{text}}}$$

$Q_{\text{type}} * Q_{\text{pos}} = 90/94$

$Q_{\text{type}} * Q_{\text{pos}} \approx 95,74\%$

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## ZEROCONFIDENCERESULT VS GENERAL

	zeroconfidenceresults = 0	zeroconfidenceresults = 1
general is set to one of the values which is not returning the unidentified types (0, 4, 6, 8, 10, 12,14)	the result will contains only the <b>identified</b> types, <b>without</b> tips type = not ,0', confidence > ,0'	the result will contains only the <b>identified</b> types, <b>with</b> tips. type = not ,0' if confidence > ,0' -> not tip if confidence = ,0' -> tip
general is set to one of the values which is returning the unidentified types (1, 3, 5, 7, 9, 11, 13, 15)	The result will contains the <b>identified</b> and the <b>unidentified</b> types as well, <b>without</b> tips. if type = ,0' -> unidentified type, which is not in the database yet if type = not ,0' -> known type, which is in the database confidence > ,0'	The result will contains the <b>identified</b> and the <b>unidentified</b> types as well, <b>with</b> tips. if type = ,0' -> unidentified type, which is not in the database yet if type = not ,0' -> known type, which is in the database if confidence > ,0' -> not tip if confidence = ,0' -> tip

There is an inside confidence in CARMEN®, which is not seen by the users. This confidence decides if the reading is a tip or not. It can happen that a result which has "20" as confidence still it is not a tip, and on the other side if a result which has "30" as confidence but will be returned as a tip!

Possible results in ADI Demo (confidencemode = 7; general = ['1', '3', '5', '7', '9', '11', '13', '15']; zeroconfidenceresults = '1')

GC = get\_confidence (this is the value which is visible in ADI; conf\_mode1 = text (C1); conf\_mode2 = type (C2); conf\_mode4 = position (C7); conf\_mode7= product of the previous)

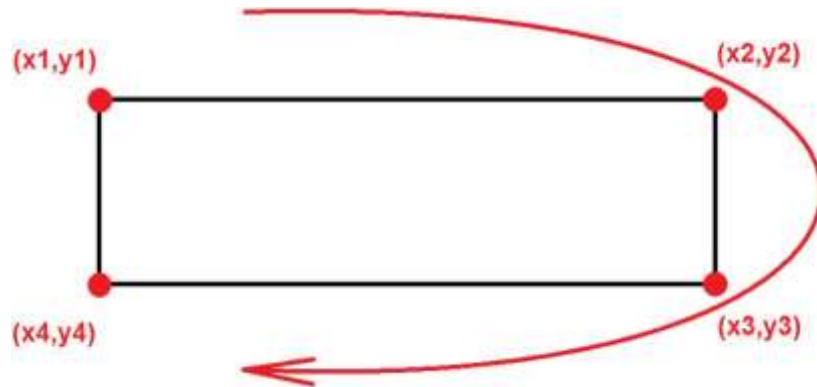
Country/State	Confidence	What it means?	Exact values from code
(0)	0	tip for an unidendified type	GC = '0'; C1 = "; C2 = "; C4 = "; C7 = ";
(0)	43	unidentified type, but not a tip	GC = '43'; C1 = '62'; C2 = '69'; C4 = '100'; C7 = '43'; -> in this case C2 means that the engine is 69% sure that this type is not part of the database!
USA (508115)	0	known type, but only a tip	GC = '0'; C1 = '67'; C2 = '32'; C4 = '100'; C7 = '21'; -> as GC = '0', this is a tip, C2 means that the engine is 32% sure that the result is that type, but the inside confidence return this value only as a tip. C7 is not '0', because GC became '0' because of the inside confidence decided to make this only a tip!
USA (508115)	20	known type, not a tip	GC = '20'; C1 = '84'; C2 = '24'; C4 = '100'; C7 = '20'; -> the C7 is smaller than in the previous case, but still not a tip, based on the inside confidence decision

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## CALCULATING THE MINIMAL BOUNDING RECTANGLE OF THE RETURNED LICENSE PLATE

The engine returns a 4-point polygon as the frame of the license plate. This is not necessarily rectangular, and there can be cases **when some points are out of the image** (for example if the license plate is at the very edge of the image), if this happens, **negative numbers will be returned**.

The type of the cmNP::frame is gxPG4. It consists of 4 coordinate pairs (x1,y1; x2,y2; x3,y3; x4,y4), which are situated clockwise on the rectangle starting with the upper left corner:



Therefore, 4 points will be received, each referred by x and y coordinates. The coordinates of the top left and bottom right corners of the minimal bounding rectangle can be calculated, as explained in the following drawing:

Top left corner:  $x\_min = \min(\max(0, \min(x1, x2, x3, x4)), \text{image.xsize})$

$y\_min = \min(\max(0, \min(y1, y2, y3, y4)), \text{image.ysize})$



Bottom right corner:  $x\_max = \max(0, \min(\max(x1, x2, x3, x4), \text{image.xsize}))$

$y\_max = \max(0, \min(\max(y1, y2, y3, y4), \text{image.ysize}))$

Based on these formulas, width and height of the bounding rectangle can also be calculated.

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## RETRIEVING COUNTRY NAMES FROM RETURNED PLATE TYPE VALUES

This chapter only applies to region-specific engines.

The returned cmNP::type value will be 0 (plate type info is not available) if either of these applies:

- the engine does not include country/state recognition option
- the engine cannot determine the country/state of the plate

The returned cmNP::type value by the engine contains the following information:

- country of the plate
- state information (or province – where applicable)
- subtype of the plate (based on syntax and layout, if detailed information is needed, feel free to contact ARH Support Team)

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## COUNTRY AND STATE ID'S

(FOR ENGINE VERSION 7.2.8.X; 7.3.9.X; 7.3.10.X, 7.3.11.X, 7.3.12.X AND ABOVE)  
(e.g. cmanpr-7.2.8.6-latin or cmanpr-eur-7.3.12.5\_20Q2)

### Note

The following calculation applies only for **engine versions 7.2.8.x** and above (e.g. cmanpr-7.2.8.6-latin).

The type value (T) is a decimal between 100000 and 999999. Divided this type value by 1000 the result is the code of the country (C). The remainder defines the subtype (S) within the country.

Example: USA engine



cmNP::type: 550549

C=550549/1000=550 defines USA-FL as country with the state.

The remainder (S) =549, refers to the above standard, single-row Florida plate format:

'letter number number number letter letter'

Example: Latin engine



cmNP::type: 101011

C=101011/1000=101 defines HUN (Hungary) as country.

The remainder (S) =011, refers to the standard, single-row Hungarian EU-plate



cmNP::type: 122012

C=122012/1000=122 defines DEU (Germany) as country.

The remainder (S) =012, refers to the standard, single-row German EU-plate

#### Note

##### NOTE FOR THE BELOW TABLES

Rows with **gray background** indicate that although the type code range is pre-reserved, the given country's licence plates are recognized without type codes.

Upon request, they can be supported with type recognition too. For details contact your sales representative.

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Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country - State (short)	Country - State (long)	Country - State (CountryName)
<b>Europe</b>						
101	101000 - 101999	HUN		HUN	Hungary	HUN
102	102000 - 102999	AUT		AUT	Austria	AUT
103	103000 - 103999	SVK		SVK	Slovakia	SVK
104	104000 - 104999	CZE		CZE	Czech Republic	CZE
105	105000 - 105999	SVN		SVN	Slovenia	SVN
106	106000 - 106999	POL		POL	Poland	POL
107	107000 - 107999	EST		EST	Estonia	EST
108	108000 - 108999	LVA		LVA	Latvia	LVA
109	109000 - 109999	LTU		LTU	Lithuania	LTU
110	110000 - 110999	ROU		ROU	Romania	ROU
111	111000 - 111999	BGR		BGR	Bulgaria	BGR
112	112000 - 112999	HRV		HRV	Croatia	HRV
113	113000 - 113999	BIH		BIH	Bosnia Herzegovina	BIH
114	114000 - 114999	SRB		SRB	Serbia	SRB
115	115000 - 115999	MKD		MKD	North_Macedonia	MKD
116	116000 - 116999	MNE		MNE	Montenegro	MNE
117	117000 - 117999	ALB		ALB	Albania	ALB
118	118000 - 118999	GRC		GRC	Greece	GRC
119	119000 - 119999	TUR		TUR	Turkey	TUR
120	120000 - 120999	NLD		NLD	Netherlands	NLD
121	121000 - 121999	LUX		LUX	Luxembourg	LUX
122	122000 - 122999	DEU		DEU	Germany	DEU
123	123000 - 123999	BEL		BEL	Belgium	BEL
124	124000 - 124699	FRA	FRA	FRA-FRA	France - French	FRA-FRA
124	124700 - 124999	FRA	OT	FRA-OT	France - Overseas territory	FRA-OT
125	125000 - 125999	CHE		CHE	Switzerland	CHE
126	126000 - 126999	ITA		ITA	Italy	ITA
127	127000 - 127999	PRT		PRT	Portugal	PRT
128	128000 - 128999	ESP		ESP	Spain	ESP
129	129000 - 129999	EUR		EUR	European Organization	EUR
131	131000 - 131799	DNK	DNK	DNK-DNK	Denmark - Denmark	DNK-DNK
131	131800 - 131899	DNK	FRO	DNK-FRO	Denmark - Faroe Islands	DNK-FRO
131	131900 - 131999	DNK	GRL	DNK-GRL	Denmark - Greenland	DNK-GRL
132	132000 - 132999	NOR		NOR	Norway	NOR
133	133000 - 133999	SWE		SWE	Sweden	SWE
134	134000 - 134899	FIN	FIN	FIN-FIN	Finland - Finland	FIN-FIN
134	134900 - 134999	FIN	ALA	FIN-ALA	Finland - Aland	FIN-ALA
140	140000 - 140999	GBR	GBR	GBR-GBR	Great Britain - Great Britain	GBR-GBR
141	141000 - 141999	GIB		GIB	Gibraltar	GIB
142	142000 - 142999	IMN		IMN	Isle of Man	IMN
143	143000 - 143999	JEY		JEY	Jersey	JEY
144	144000 - 144999	GGY		GGY	Guernsey	GGY
145	145000 - 145999	ALD		ALD	Alderney	ALD
146	146000 - 146999	GBR	NIR	GBR-NIR	Great Britain - Northern Ireland	GBR-NIR
149	149000 - 149999	IRL		IRL	Ireland	IRL
171	171000 - 171999	RUS		RUS	Russia	RUS
172	172000 - 172799	UKR		UKR	Ukraine	UKR
172	172800 - 172899	UKR	LPR	UKR-LPR	Ukraine - Luhansk	UKR-LPR

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country - State (short)	Country - State (long)	Country - State (CountryName)
172	172900 - 172999	UKR	DPR	UKR-DPR	Ukraine - Donetsk	UKR-DPR
173	173000 - 173799	MDA	MDA	MDA-MDA	Moldavia - Moldavia	MDA-MDA
173	173800 - 173999	MDA	RMN	MDA-RMN	Moldavia - Transnistria	MDA-RMN
174	174000 - 174999	BLR		BLR	Belarus	BLR
175	175000 - 175799	GEO	GEO	GEO-GEO	Georgia - Georgia	GEO-GEO
175	175800 - 175899	GEO	ABH	GEO-ABH	Georgia - Abkhazia	GEO-ABH
175	175900 - 175999	GEO	RSO	GEO-RSO	Georgia - South Ossetia	GEO-RSO
176	176000 - 176999	AZE		AZE	Azerbaijan	AZE
177	177000 - 177999	ARM		ARM	Armenia	ARM
178	178000 - 178999	KAZ		KAZ	Kazakhstan	KAZ
180	180000 - 180999	AND		AND	Andorra	AND
181	181000 - 181999	MCO		MCO	Monaco	MCO
182	182000 - 182999	LIE		LIE	Liechtenstein	LIE
183	183000 - 183999	SMR		SMR	San Marino	SMR
184	184000 - 184999	VAT		VAT	Vatican City	VAT
185	185000 - 185999	RKS		RKS	Kosovo	RKS
190	190000 - 190999	ISL		ISL	Iceland	ISL
191	191000 - 191999	MLT		MLT	Malta	MLT
192	192000 - 192799	CYP	SCP	CYP-SCP	South Cyprus	CYP-SCP
192	192800 - 192899	CYP	UCP	CYP-UCP	UN Cyprus	CYP-UCP
192	192900 - 192999	CYP	NCP	CYP-NCP	North Cyprus	CYP-NCP
193	193000 - 193999	SJM		SJM	Svalbard and Jan Mayen	SJM
<b>Middle East and Asia</b>						
201	201000 - 201999	ISR		ISR	Israel	ISR
202	202000 - 202999	PSE		PSE	Palestine	PSE
206	206000 - 206999	SYR		SYR	Syria	SYR
207	207000 - 207999	LBN		LBN	Lebanon	LBN
208	208000 - 208099	IRQ	MIX	IRQ-MIX	Iraq - Iraq MIX	IRQ-MIX
208	208100 - 208149	IRQ	BAG	IRQ-BAG	Iraq - Baghdad	IQ-BG
208	208150 - 208199	IRQ	SAL	IRQ-SAL	Iraq - Salah ad-Din	IQ-SD
208	208200 - 208249	IRQ	DIY	IRQ-DIY	Iraq - Diyala	IQ-DI
208	208250 - 208299	IRQ	WAS	IRQ-WAS	Iraq - Wasit	IQ-WA
208	208300 - 208349	IRQ	MAY	IRQ-MAY	Iraq - Maysan	IQ-MA
208	208350 - 208399	IRQ	ALB	IRQ-ALB	Iraq - Al-Basrah	IQ-BA
208	208400 - 208449	IRQ	BAB	IRQ-BAB	Iraq - Babil	IQ-BB
208	208450 - 208499	IRQ	ALA	IRQ-ALA	Iraq - Al-Anbar	IQ-AN
208	208500 - 208549	IRQ	KIR	IRQ-KIR	Iraq - Kirkuk	IQ-KI
208	208550 - 208599	IRQ	ALK	IRQ-ALK	Iraq - Al-Karbala	IQ-KA
208	208600 - 208649	IRQ	NIN	IRQ-NIN	Iraq - Niniwa	IQ-NI
208	208650 - 208699	IRQ	ANA	IRQ-ANA	Iraq - An-Najaf	IQ-NA
208	208700 - 208749	IRQ	DHI	IRQ-DHI	Iraq - Dhi Qar	IQ-DQ
208	208750 - 208799	IRQ	ALQ	IRQ-ALQ	Iraq - Al-Qadisiyyah	IQ-QA
208	208800 - 208849	IRQ	ALM	IRQ-ALM	Iraq - Al-Muthanna	IQ-MU
208	208850 - 208874	IRQ	DIH	IRQ-DIH	Iraq - Dahuk	IQ-DA
208	208900 - 208924	IRQ	LSE	IRQ-LSE	Iraq - Al-Sulaimaniyah	IQ-SU
208	208950 - 208974	IRQ	ARB	IRQ-ARB	Iraq - Arbil	IQ-AR
208	208975 - 208999	IRQ	HAL	IRQ-HAL	Iraq - Halabja	IQ-HA
209	209000 - 209999	JOR		JOR	Jordan	JOR
210	210000 - 210999	SAU		SAU	Saudi Arabia	SAU
211	211000 - 211999	KWT		KWT	Kuwait	KWT
212	212000 - 212099	ARE	GOV	ARE-GOV	United Arab Emirates - Government ARE	ARE-GOV

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country - State (short)	Country - State (long)	Country - State (CountryName)
212	212100 - 212199	ARE	DUB	ARE-DUB	United Arab Emirates - Dubai	AE-DU
212	212200 - 212299	ARE	AD	ARE-AD	United Arab Emirates - Abu Dhabi	AE-AZ
212	212300 - 212399	ARE	AJM	ARE-AJM	United Arab Emirates - Ajman	AE-AJ
212	212400 - 212499	ARE	FUJ	ARE-FUJ	United Arab Emirates - Fujairah	AE-FU
212	212500 - 212599	ARE	SHJ	ARE-SHJ	United Arab Emirates - Sharjah	AE-SH
212	212600 - 212699	ARE	UAQ	ARE-UAQ	United Arab Emirates - Um al-Quwain	AE-UQ
212	212700 - 212799	ARE	RAK	ARE-RAK	United Arab Emirates - Ras al-Khaimah	AE-RK
212	212800 - 212899	ARE	UNK	ARE-UNK	United Arab Emirates - Unknown ARE	ARE-UNK
212	212900 - 212999	ARE	DUB	ARE-DUB	United Arab Emirates - Dubai	AE-DU
213	213000 - 213999	QAT		QAT	Qatar	QAT
214	214000 - 214999	BHR		BHR	Bahrain	BHR
215	215000 - 215999	OMN		OMN	Oman	OMN
216	216000 - 216999	YEM		YEM	Yemen	YEM
217	217000 - 217099	ARE	AD	ARE-AD	United Arab Emirates - Abu Dhabi	AE-AZ
217	217100 - 217199	ARE	RAK	ARE-RAK	United Arab Emirates - Ras al-Khaimah	AE-RK
220	220000 - 220899	IRN	IRN	IRN-IRN	Iran - Iran	IRN-IRN
220	220900 - 220999	IRN	INL	IRN-INL	Iran - International Iran	IRN-INT
221	221000 - 221999	UZB		UZB	Uzbekistan	UZB
222	222000 - 222999	TKM		TKM	Turkmenistan	TKM
223	223000 - 223999	TJK		TJK	Tajikistan	TJK
224	224000 - 224999	KGZ		KGZ	Kyrgyzstan	KGZ
225	225000 - 225999	MNG		MNG	Mongolia	MNG
226	226000 - 226999	AFG		AFG	Afghanistan	AFG
227	227000 - 227999	PAK		PAK	Pakistan	PAK
240	240000 - 240999	CHN		CHN	China	CHN
241	241000 - 241999	HKG		HKG	Hong Kong	HKG
242	242000 - 242999	MAC		MAC	Macau	MAC
243	243000 - 243999	TWN		TWN	Taiwan	TWN
246	246000 - 246999	KOR		KOR	Korea South	KOR
247	247000 - 247999	PRK		PRK	Korea North	PRK
250	250000 - 250999	IND		IND	India	IND
251	251000 - 251999	NPL		NPL	Nepal	NPL
252	252000 - 252999	BTN		BTN	Bhutan	BTN
253	253000 - 253030	BGD	DHK	BGD-DHK	Bangladesh - Dhaka	BD-13
253	253031 - 253060	BGD	NNJ	BGD-NNJ	Bangladesh - Narayanganj	BD-40
253	253061 - 253090	BGD	KHN	BGD-KHN	Bangladesh - Khulna	BD-27
253	253091 - 253120	BGD	GAZ	BGD-GAZ	Bangladesh - Gazipur	BD-18
253	253121 - 253150	BGD	KUS	BGD-KUS	Bangladesh - Kushtia	BD-30
253	253151 - 253180	BGD	NDI	BGD-NDI	Bangladesh - Narsingdi	BD-42
253	253181 - 253210	BGD	RNG	BGD-RNG	Bangladesh - Rangamati	BD-56
253	253211 - 253240	BGD	SYL	BGD-SYL	Bangladesh - Sylhet	BD-60
253	253241 - 253270	BGD	BAR	BGD-BAR	Bangladesh - Barisal	BD-06
253	253271 - 253300	BGD	BOG	BGD-BOG	Bangladesh - Bogra	BD-03
253	253301 - 253330	BGD	MYM	BGD-MYM	Bangladesh - Mymensingh	BD-34
253	253331 - 253360	BGD	CHI	BGD-CHI	Bangladesh - Chittagong	BD-10
253	253361 - 253390	BGD	JES	BGD-JES	Bangladesh - Jessore	BD-22
253	253391 - 253420	BGD	SIR	BGD-SIR	Bangladesh - Sirajganj	BD-59
253	253421 - 253450	BGD	BGE	BGD-BGE	Bangladesh - Bagerhat	BD-05
253	253451 - 253480	BGD	BND	BGD-BND	Bangladesh - Bandarban	BD-01
253	253481 - 253510	BGD	BRG	BGD-BRG	Bangladesh - Barguna	BD-02
253	253511 - 253540	BGD	BHO	BGD-BHO	Bangladesh - Bhola	BD-07

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253	253541 - 253570	BGD	BRH	BGD-BRH	Bangladesh - Brahmanbaria	BD-04
253	253571 - 253600	BGD	CND	BGD-CND	Bangladesh - Chandpur	BD-09
253	253601 - 253630	BGD	CUA	BGD-CUA	Bangladesh - Chuadanga	BD-12
253	253631 - 253660	BGD	CLA	BGD-CLA	Bangladesh - Comilla	BD-08
253	253661 - 253690	BGD	COX	BGD-COX	Bangladesh - Cox's_Bazar	BD-11
253	253691 - 253720	BGD	DIN	BGD-DIN	Bangladesh - Dinajpur	BD-14
253	253721 - 253750	BGD	FAR	BGD-FAR	Bangladesh - Faridpur	BD-15
253	253751 - 253780	BGD	FEN	BGD-FEN	Bangladesh - Feni	BD-16
253	253781 - 253810	BGD	GAI	BGD-GAI	Bangladesh - Gaibandha	BD-19
253	253811 - 253840	BGD	GOP	BGD-GOP	Bangladesh - Gopalganj	BD-17
253	253841 - 253870	BGD	HAB	BGD-HAB	Bangladesh - Habiganj	BD-20
253	253871 - 253900	BGD	JAP	BGD-JAP	Bangladesh - Jamalpur	BD-21
253	253901 - 253930	BGD	JHA	BGD-JHA	Bangladesh - Jhalakati	BD-25
253	253931 - 253960	BGD	JHE	BGD-JHE	Bangladesh - Jhenaidah	BD-23
253	253961 - 253990	BGD	JOY	BGD-JOY	Bangladesh - Joypurhat	BD-24
253	253991 - 254020	BGD	KGR	BGD-KGR	Bangladesh - Khagrachari	BD-29
254	254021 - 254050	BGD	KIS	BGD-KIS	Bangladesh - Kishoreganj	BD-26
254	254051 - 254080	BGD	KUR	BGD-KUR	Bangladesh - Kurigram	BD-28
254	254081 - 254110	BGD	LAK	BGD-LAK	Bangladesh - Lakshmipur	BD-31
254	254111 - 254140	BGD	LAL	BGD-LAL	Bangladesh - Lalmonirhat	BD-32
254	254141 - 254170	BGD	MAD	BGD-MAD	Bangladesh - Madaripur	BD-36
254	254171 - 254200	BGD	MAG	BGD-MAG	Bangladesh - Magura	BD-37
254	254201 - 254230	BGD	MAN	BGD-MAN	Bangladesh - Manikganj	BD-33
254	254231 - 254260	BGD	MEH	BGD-MEH	Bangladesh - Meherpur	BD-39
254	254261 - 254290	BGD	MOU	BGD-MOU	Bangladesh - Moulvibazar	BD-38
254	254291 - 254320	BGD	MUN	BGD-MUN	Bangladesh - Munshiganj	BD-35
254	254321 - 254350	BGD	NAO	BGD-NAO	Bangladesh - Naogaon	BD-48
254	254351 - 254380	BGD	NRI	BGD-NRI	Bangladesh - Narail	BD-43
254	254381 - 254410	BGD	NAT	BGD-NAT	Bangladesh - Natore	BD-44
254	254411 - 254440	BGD	NAW	BGD-NAW	Bangladesh - Nawabganj	BD-45
254	254441 - 254470	BGD	NET	BGD-NET	Bangladesh - Netrakona	BD-41
254	254471 - 254500	BGD	NIL	BGD-NIL	Bangladesh - Nilphamari	BD-46
254	254501 - 254530	BGD	NOA	BGD-NOA	Bangladesh - Noakhali	BD-47
254	254531 - 254560	BGD	PAB	BGD-PAB	Bangladesh - Pabna	BD-49
254	254561 - 254590	BGD	PCG	BGD-PCG	Bangladesh - Panchagarh	BD-52
254	254591 - 254620	BGD	PKH	BGD-PKH	Bangladesh - Patuakhali	BD-51
254	254621 - 254650	BGD	PJP	BGD-PJP	Bangladesh - Pirojpur	BD-50
254	254651 - 254680	BGD	PJB	BGD-PJB	Bangladesh - Rajbari	BD-53
254	254681 - 254710	BGD	RJS	BGD-RJS	Bangladesh - Rajshahi	BD-54
254	254711 - 254740	BGD	RGP	BGD-RGP	Bangladesh - Rangpur	BD-55
254	254741 - 254770	BGD	SKH	BGD-SKH	Bangladesh - Satkhira	BD-58
254	254771 - 254800	BGD	SHP	BGD-SHP	Bangladesh - Shariatpur	BD-62
254	254801 - 254830	BGD	SRP	BGD-SRP	Bangladesh - Sherpur	BD-57
254	254831 - 254860	BGD	SJG	BGD-SJG	Bangladesh - Sunamganj	BD-61
254	254861 - 254890	BGD	TAN	BGD-TAN	Bangladesh - Tangail	BD-63
254	254891 - 254920	BGD	TRG	BGD-TRG	Bangladesh - Thakurgaon	BD-64
254	254921 - 254950	BGD	UNK	BGD-UNK	Bangladesh - Unknown_BGD	BD-UNK
254	254951 - 254999	BGD	OTH	BGD-OTH	Bangladesh - OtherCdGovUn	BD-OTH
260	260000 - 260009	THA	Krabi	THA-K	Thailand - Krabi	TH-81
260	260010 - 260019	THA	KAN	THA-KAN	Thailand - Kanchanaburi	TH-71
260	260020 - 260029	THA	KHO	THA-KHO	Thailand - Khon Kaen	TH-40





Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country - State (short)	Country - State (long)	Country - State (CountryName)
260	260030 - 260039	THA	CCH	THA-CCH	Thailand - Chachoengsao	TH-24
260	260040 - 260059	THA	CBU	THA-CBU	Thailand - Chon Buri	TH-20
260	260060 - 260069	THA	CHR	THA-CHR	Thailand - Chiang Rai	TH-57
260	260070 - 260079	THA	CHM	THA-CHM	Thailand - Chiang Mai	TH-50
260	260080 - 260089	THA	TNG	THA-TNG	Thailand - Trang	TH-92
260	260090 - 260099	THA	NPA	THA-NPA	Thailand - Nakhon Pathom	TH-73
260	260100 - 260109	THA	NRA	THA-NRA	Thailand - Nakhon Ratchasima	TH-30
260	260110 - 260119	THA	NST	THA-NST	Thailand - Nakhon Si Thammarat	TH-80
260	260120 - 260129	THA	NSA	THA-NSA	Thailand - Nakhon Sawan	TH-60
260	260130 - 260139	THA	NON	THA-NON	Thailand - Nonthaburi	TH-12
260	260140 - 260159	THA	PAT	THA-PAT	Thailand - Pattani	TH-94
260	260160 - 260169	THA	PNA	THA-PNA	Thailand - Phra Nakhon Si Ayutthaya	TH-14
260	260170 - 260179	THA	PAR	THA-PAR	Thailand - Phetchaburi	TH-76
260	260180 - 260189	THA	PHU	THA-PHU	Thailand - Phuket	TH-83
260	260190 - 260209	THA	YAL	THA-YAL	Thailand - Yala	TH-95
260	260210 - 260219	THA	RAT	THA-RAT	Thailand - Ratchaburi	TH-70
260	260220 - 260229	THA	SAT	THA-SAT	Thailand - Satun	TH-91
260	260230 - 260239	THA	SSM	THA-SSM	Thailand - Samut Songkhram	TH-75
260	260240 - 260249	THA	SBU	THA-SBU	Thailand - Saraburi	TH-19
260	260250 - 260259	THA	SUB	THA-SUB	Thailand - Suphan Buri	TH-72
260	260260 - 260279	THA	SUT	THA-SUT	Thailand - Surat Thani	TH-84
260	260280 - 260289	THA	SUR	THA-SUR	Thailand - Surin	TH-32
260	260290 - 260299	THA	BAT	THA-BAT	Thailand - Batong	
260	260300 - 260319	THA	Bangkok	THA-Ban	Thailand - Bangkok	TH-10
260	260320 - 260339	THA	SOK	THA-SOK	Thailand - Songkhla	TH-90
260	260340 - 260839	THA	UNK	THA-UNK	Thailand - Unknown THA	
260	260840 - 260849	THA	CNA	THA-CAN	Thailand - Chai_Nat	TH-18
260	260850 - 260859	THA	CHU	THA-CHU	Thailand - Chumphon	TH-86
260	260860 - 260869	THA	NAR	THA-NAR	Thailand - Narathiwat	TH-96
260	260870 - 260879	THA	BRA	THA-BRA	Thailand - Buri_Ram	TH-31
260	260880 - 260889	THA	PKK	THA-PKK	Thailand - Prachuap_Khiri_Khan	TH-77
260	260890 - 260899	THA	PBU	THA-PBU	Thailand - Prachin_Buri	TH-25
260	260900 - 260909	THA	PAT	THA-PAT	Thailand - Pattani	TH-94
260	260910 - 260919	THA	RET	THA-RET	Thailand - Roi_Et	TH-45
260	260920 - 260929	THA	RAN	THA-RAN	Thailand - Ranong	TH-85
260	260930 - 260939	THA	LOB	THA-LOB	Thailand - Lop_Buri	TH-16
260	260940 - 260949	THA	SNA	THA-SNA	Thailand - Sakon_Nakhon	TH-47
260	260950 - 260959	THA	SPR	THA-SPR	Thailand - Samut_Prakan	TH-11
260	260960 - 260969	THA	SSN	THA-SSN	Thailand - Samut_Sakhon	TH-74
260	260970 - 260979	THA	SAK	THA-SAK	Thailand - Sa_Kaeo	TH-27
260	260980 - 260989	THA	SUB	THA-SUB	Thailand - Suphan_Buri	TH-72
260	260990 - 260999	THA	UDT	THA-UDT	Thailand - Udon_Thani	TH-41
261	261000 - 261019	THA	GOV	THA-GOV	Thailand - Government THA	
261	261020 - 261049	THA	UNK	THA-UNK	Thailand - Unknown THA	
261	261050 - 261069	THA	Bangkok	THA-Ban	Thailand - Bangkok	TH-10
261	261070 - 261079	THA	Krabi	THA-Kra	Thailand - Krabi	TH-81
261	261080 - 261089	THA	KAN	THA-KAN	Thailand - Kanchanaburi	TH-71
261	261090 - 261099	THA	KAL	THA-KAL	Thailand - Kalasin	TH-46
261	261100 - 261109	THA	KAM	THA-KAM	Thailand - Kamphaeng Phet	TH-62
261	261110 - 261119	THA	KHO	THA-KHO	Thailand - Khon Kaen	TH-40
261	261120 - 261129	THA	CNT	THA-CNT	Thailand - Chanthaburi	TH-22

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
261	261130 - 261139	THA	CCH	THA-CCH	Thailand - Chachoengsao	TH-24
261	261140 - 261149	THA	CBU	THA-CBU	Thailand - Chon Buri	TH-20
261	261150 - 261159	THA	CNA	THA-CNA	Thailand - Chai Nat	TH-18
261	261160 - 261169	THA	CIY	THA-CIY	Thailand - Chaiyaphum	TH-36
261	261170 - 261179	THA	CHU	THA-CHU	Thailand - Chumphon	TH-86
261	261180 - 261189	THA	CHR	THA-CHR	Thailand - Chiang Rai	TH-57
261	261190 - 261199	THA	CHM	THA-CHM	Thailand - Chiang Mai	TH-50
261	261200 - 261209	THA	TNG	THA-TNG	Thailand - Trang	TH-92
261	261210 - 261219	THA	TRA	THA-TRA	Thailand - Trat	TH-23
261	261220 - 261229	THA	TAK	THA-TAK	Thailand - Tak	TH-63
261	261230 - 261239	THA	NNA	THA-NNA	Thailand - Nakhon Nayok	TH-26
261	261240 - 261249	THA	NPA	THA-NPA	Thailand - Nakhon Pathom	TH-73
261	261250 - 261259	THA	NPH	THA-NPH	Thailand - Nakhon Phanom	TH-48
261	261260 - 261269	THA	NRA	THA-NRA	Thailand - Nakhon Ratchasima	TH-30
261	261270 - 261279	THA	NST	THA-NST	Thailand - Nakhon Si Thammarat	TH-80
261	261280 - 261289	THA	NSA	THA-NSA	Thailand - Nakhon Sawan	TH-60
261	261290 - 261299	THA	NON	THA-NON	Thailand - Nonthaburi	TH-12
261	261300 - 261309	THA	NAR	THA-NAR	Thailand - Narathiwat	TH-96
261	261310 - 261319	THA	NAN	THA-NAN	Thailand - Nan	TH-55
261	261320 - 261329	THA	BRA	THA-BRA	Thailand - Buri Ram	TH-31
261	261330 - 261339	THA	PTH	THA-PTH	Thailand - Pathum Thani	TH-13
261	261340 - 261349	THA	PKK	THA-PKK	Thailand - Prachuap Khiri Khan	TH-77
261	261350 - 261359	THA	PBU	THA-PBU	Thailand - Prachin Buri	TH-25
261	261360 - 261369	THA	PAT	THA-PAT	Thailand - Pattani	TH-94
261	261370 - 261379	THA	PNA	THA-PNA	Thailand - Phra Nakhon Si Ayutthaya	TH-14
261	261380 - 261389	THA	PYA	THA-PYA	Thailand - Phayao	TH-56
261	261390 - 261399	THA	PNG	THA-PNG	Thailand - Phangnga	TH-82
261	261400 - 261409	THA	PTT	THA-PTT	Thailand - Phatthalung	TH-93
261	261410 - 261419	THA	PCH	THA-PCH	Thailand - Phichit	TH-66
261	261420 - 261429	THA	PTS	THA-PTS	Thailand - Phitsanulok	TH-65
261	261430 - 261439	THA	PAR	THA-PAR	Thailand - Phetchaburi	TH-76
261	261440 - 261449	THA	PAN	THA-PAN	Thailand - Phetchabun	TH-67
261	261450 - 261459	THA	PRA	THA-PRA	Thailand - Phrae	TH-54
261	261460 - 261469	THA	PHU	THA-PHU	Thailand - Phuket	TH-83
261	261470 - 261479	THA	MSA	THA-MSA	Thailand - Maha Sarakham	TH-44
261	261480 - 261489	THA	MUK	THA-MUK	Thailand - Mukdahan	TH-49
261	261490 - 261499	THA	MHS	THA-MHS	Thailand - Mae Hong Son	TH-58
261	261500 - 261509	THA	YAS	THA-YAS	Thailand - Yasothon	TH-35
261	261510 - 261519	THA	YAL	THA-YAL	Thailand - Yala	TH-95
261	261520 - 261529	THA	RET	THA-RET	Thailand - Roi Et	TH-45
261	261530 - 261539	THA	RAN	THA-RAN	Thailand - Ranong	TH-85
261	261540 - 261549	THA	RAY	THA-RAY	Thailand - Rayong	TH-21
261	261550 - 261559	THA	RAT	THA-RAT	Thailand - Ratchaburi	TH-70
261	261560 - 261569	THA	LOB	THA-LOB	Thailand - Lop Buri	TH-16
261	261570 - 261579	THA	LPA	THA-LPA	Thailand - Lampang	TH-52
261	261580 - 261589	THA	LPH	THA-LPH	Thailand - Lamphun	TH-51
261	261590 - 261599	THA	LOE	THA-LOE	Thailand - Loei	TH-42
261	261600 - 261609	THA	SSK	THA-SSK	Thailand - Si Sa Ket	TH-33
261	261610 - 261619	THA	SNA	THA-SNA	Thailand - Sakon Nakhon	TH-47
261	261620 - 261629	THA	SOK	THA-SOK	Thailand - Songkhla	TH-90
261	261630 - 261639	THA	SAT	THA-SAT	Thailand - Satun	TH-91





Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country - State (short)	Country - State (long)	Country - State (CountryName)
261	261640 - 261649	THA	SPR	THA-SPR	Thailand - Samut Prakan	TH-11
261	261650 - 261659	THA	SSM	THA-SSM	Thailand - Samut Songkhram	TH-75
261	261660 - 261669	THA	SSN	THA-SSN	Thailand - Samut Sakhon	TH-74
261	261670 - 261679	THA	SAK	THA-SAK	Thailand - Sa Kaeo	TH-27
261	261680 - 261689	THA	SBU	THA-SBU	Thailand - Saraburi	TH-19
261	261690 - 261699	THA	SIB	THA-SIB	Thailand - Sing Buri	TH-17
261	261700 - 261709	THA	SUK	THA-SUK	Thailand - Sukhothai	TH-64
261	261710 - 261719	THA	SUB	THA-SUB	Thailand - Suphan Buri	TH-72
261	261720 - 261729	THA	SUT	THA-SUT	Thailand - Surat Thani	TH-84
261	261730 - 261739	THA	SUR	THA-SUR	Thailand - Surin	TH-32
261	261740 - 261749	THA	NKH	THA-NKH	Thailand - Nong Khai	TH-43
261	261750 - 261759	THA	NBL	THA-NBL	Thailand - Nong Bua Lam Phu	TH-39
261	261760 - 261769	THA	ATH	THA-ATH	Thailand - Ang Thong	TH-15
261	261770 - 261779	THA	UDT	THA-UDT	Thailand - Udon Thani	TH-41
261	261780 - 261789	THA	UTT	THA-UTT	Thailand - Uttaradit	TH-53
261	261790 - 261799	THA	UTH	THA-UTH	Thailand - Uthai Thani	TH-61
261	261800 - 261809	THA	UBR	THA-UBR	Thailand - Ubon Ratchathani	TH-34
261	261810 - 261819	THA	AMC	THA-AMC	Thailand - Amnat Charoen	TH-37
261	261820 - 261829	THA	BAT	THA-BAT	Thailand - Batong	THA-BAT
261	261830 - 261849	THA	Bangkok	THA-Ban	Thailand - Bangkok	TH-10
261	261850 - 261859	THA	SOK	THA-SOK	Thailand - Songkhla	TH-90
261	261860 - 261869	THA	PAT	THA-PAT	Thailand - Pattani	TH-94
261	261870 - 261879	THA	NAR	THA-NAR	Thailand - Narathiwat	TH-96
261	261880 - 261889	THA	BUK	THA-BUK	Thailand - Bueng Kan	TH-38
261	261890 - 261899	THA	CHU	THA-CHU	Thailand - Chumphon	TH-86
261	261990 - 261999	THA	OTH	THA-OTH	Thailand - Other	THA-OTH
262	262000 - 262999	MYS		MYS	Malaysia	MYS
263	263000 - 263999	SGP		SGP	Singapore	SGP
264	264000 - 264999	MMR		MMR	Myanmar	MMR
265	265000 - 265049	LAO	GOV	LAO-GOV	Laos - Government LAO	
265	265050 - 265099	LAO	UNK	LAO-UNK	Laos - Unknown LAO	
265	265100 - 265149	LAO	ATT	LAO-ATT	Laos - Attapeu	LA-AT
265	265150 - 265199	LAO	BOK	LAO-BOK	Laos - Bokeo	LA-BK
265	265200 - 265249	LAO	BOL	LAO-BOL	Laos - Bolikhamsai	LA-BL
265	265250 - 265299	LAO	CHA	LAO-CHA	Laos - Champasak	LA-CH
265	265300 - 265349	LAO	HOU	LAO-HOU	Laos - Houaphanh	LA-HO
265	265350 - 265399	LAO	KHA	LAO-KHA	Laos - Khammouane	LA-KH
265	265400 - 265449	LAO	LNA	LAO-LNA	Laos - Luang Namtha	LA-LM
265	265450 - 265499	LAO	LPR	LAO-LPR	Laos - Luang Prabang	LA-LP
265	265500 - 265549	LAO	OUA	LAO-OUA	Laos - Oudomxay	LA-OU
265	265550 - 265599	LAO	PHO	LAO-PHO	Laos - Phongsali	LA-PH
265	265600 - 265649	LAO	SAL	LAO-SAL	Laos - Salavan	LA-SL
265	265650 - 265699	LAO	SAV	LAO-SAV	Laos - Savannakhet	LA-SV
265	265700 - 265749	LAO	VIE	LAO-VIE	Laos - Vientiane Province	LA-VI
265	265750 - 265799	LAO	UVI	LAO-UVI	Laos - Urban Vientiane	LA-VT
265	265800 - 265849	LAO	SAI	LAO-SAI	Laos - Sainyabuli	LA-XA
265	265850 - 265899	LAO	SEK	LAO-SEK	Laos - Sekong	LA-XE
265	265900 - 265949	LAO	XIA	LAO-XIA	Laos - Xiangkhouang	LA-XI
265	265950 - 265999	LAO	XAI	LAO-XAI	Laos - Xaisomboun	LA-XS
266	266000 - 266024	KHM	BAN	KHM-BAN	Cambodia - Banteay Meanchey	KH-1
266	266025 - 266049	KHM	BAT	KHM-BAT	Cambodia - Battambang	KH-2



Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
266	266050 - 266074	KHM	KCM	KHM-KCM	Cambodia - Kampong Cham	KH-3
266	266075 - 266099	KHM	KCG	KHM-KCG	Cambodia - Kampong Chhnang	KH-4
266	266100 - 266124	KHM	KSP	KHM-KSP	Cambodia - Kampong Speu	KH-5
266	266125 - 266149	KHM	KTH	KHM-KTH	Cambodia - Kampong Thom	KH-6
266	266150 - 266174	KHM	KAM	KHM-KAM	Cambodia - Kampot	KH-7
266	266175 - 266199	KHM	KAN	KHM-KAN	Cambodia - Kandal	KH-8
266	266200 - 266224	KHM	KOH	KHM-KOH	Cambodia - Koh Kong	KH-9
266	266225 - 266249	KHM	KEP	KHM-KEP	Cambodia - Kep	KH-23
266	266250 - 266274	KHM	KRA	KHM-KRA	Cambodia - Kratie	KH-10
266	266275 - 266299	KHM	MON	KHM-MON	Cambodia - Mondulhiri	KH-11
266	266300 - 266324	KHM	ODM	KHM-ODM	Cambodia - Oddar Meanchey	KH-22
266	266325 - 266349	KHM	PAI	KHM-PAI	Cambodia - Pailin	KH-24
266	266350 - 266374	KHM	PHN	KHM-PHN	Cambodia - Phnom Penh	KH-12
266	266375 - 266399	KHM	SIH	KHM-SIH	Cambodia - Sihanoukville	KH-18
266	266400 - 266424	KHM	PVI	KHM-PVI	Cambodia - Preah Vihear	KH-13
266	266425 - 266449	KHM	PUR	KHM-PUR	Cambodia - Pursat	KH-15
266	266450 - 266474	KHM	PVE	KHM-PVE	Cambodia - Prey Veng	KH-14
266	266475 - 266499	KHM	RAT	KHM-RAT	Cambodia - Ratanakiri	KH-16
266	266500 - 266524	KHM	SIE	KHM-SIE	Cambodia - Siem Reap	KH-17
266	266525 - 266549	KHM	STU	KHM-STU	Cambodia - Stung Treng	KH-19
266	266550 - 266574	KHM	SVA	KHM-SVA	Cambodia - Svay Rieng	KH-20
266	266575 - 266599	KHM	TAK	KHM-TAK	Cambodia - Takeo	KH-21
266	266600 - 266649	KHM	GOV	KHM-GOV	Cambodia - Government	
266	266650 - 266699	KHM	UNK	KHM-UNK	Cambodia - Unknown	
266	266700 - 266999	KHM	TBO	KHM-TBO	Tbong Khmum	KH-22
267	267000 - 267999	VNM		VNM	Vietnam	VNM
270	270000 - 270999	IDN		IDN	Indonesia	IDN
271	271000 - 271999	PNG		PNG	Papua New Guinea	PNG
272	272000 - 272999	TLS		TLS	Timor Leste	TLS
273	273000 - 273999	BRN		BRN	Brunei	BRN
290	290000 - 290999	LKA		LKA	Sri Lanka	LKA
291	291000 - 291999	PHL		PHL	Philippines	PHL
292	292000 - 292999	JPN		JPN	Japan	JPN
293	293000 - 293999	MDV		MDV	Maldives	MDV
294	294000 - 294999	CXR		CRX	Christmas Island	CXR
295	295000 - 295999	CCK		CCK	Keeling Islands	CCK
<b>Australia – New Zealand</b>						
300	300000 - 300999	AUS	UNK	AUS-UNK	Australia - Unknown AUS	
301	301000 - 301499	AUS	FIS	AUS-FIS	Australia - Federal-Interstate	
301	301500 - 301999	AUS	GOV	AUS-GOV	Australia - Government AUS	
302	302000 - 302999	AUS	ACT	AUS-ACT	Australia - Australian Capital Territory	AU-ACT
303	303000 - 303999	AUS	NT	AUS-NT	Australia - Northern Territory	AU-NT
304	304000 - 304999	AUS	NSW	AUS-NSW	Australia - New South Wales	AU-NSW
305	305000 - 305999	AUS	QLD	AUS-QLD	Australia - Queensland	AU-QLD
306	306000 - 306999	AUS	SA	AUS-SA	Australia - South Australia	AU-SA
307	307000 - 307999	AUS	TAS	AUS-TAS	Australia - Tasmania	AU-TAS
308	308000 - 308999	AUS	VIC	AUS-VIC	Australia - Victoria	AU-VIC
309	309000 - 309999	AUS	WA	AUS-WA	Australia - Western Australia	AU-WA
310	310000 - 310999	NZL		NZL	New Zealand	NZL
<b>Africa</b>						
401	401000 - 401999	MAR		MAR	Morocco	MAR

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
402	402000 - 402999	DZA		DZA	Algeria	DZA
403	403000 - 403899	TUN	TUN	TUN-TUN	Tunisia	
403	403900 - 403999	TUN	INT	TUN-INT	International Tunisia	TUN-INT
404	404000 - 404999	LBY		LBY	Libya	LBY
405	405000 - 405999	EGY		EGY	Egypt	EGY
406	406000 - 406999	SDN		SDN	Sudan	SDN
407	407000 - 407999	ETH		ETH	Ethiopia	ETH
408	408000 - 408999	AGO		AGO	Angola	AGO
409	409000 - 409999	BEN		BEN	Benin	BEN
410	410000 - 410999	GNB		GNB	Guinea Bissau	GNB
411	411000 - 411999	BFA		BFA	Burkina-Faso	BFA
412	412000 - 412999	BDI		BDI	Burundi	BDI
413	413000 - 413999	COM		COM	Comoros	COM
414	414000 - 414999	TCD		TCD	Chad	TCD
415	415000 - 415999	DJI		DJI	Djibouti	DJI
416	416000 - 416999	GNQ		GNQ	Equatorial Guinea	GNQ
417	417000 - 417999	ERI		ERI	Eritrea	ERI
418	418000 - 418999	GAB		GAB	Gabon	GAB
419	419000 - 419999	GMB		GMB	Gambia	GMB
420	420000 - 420999	GHA		GHA	Ghana	GHA
421	421000 - 421999	GIN		GIN	Guinea	GIN
422	422000 - 422999	CMR		CMR	Cameroon	CMR
423	423000 - 423999	KEN		KEN	Kenya	KEN
424	424000 - 424999	COG		COG	Congo-Brazzaville	COG
425	425000 - 425999	COD		COD	Dem. Rep of Congo	COD
426	426000 - 426999	CAF		CAF	Central African Republic	CAF
427	427000 - 427999	LBR		LBR	Liberia	LBR
428	428000 - 428999	MDG		MDG	Madagascar	MDG
429	429000 - 429999	MWI		MWI	Malawi	MWI
430	430000 - 430999	MLI		MLI	Mali	MLI
431	431000 - 431999	MRT		MRT	Mauritania	MRT
432	432000 - 432999	MUS		MUS	Mauritius	MUS
433	433000 - 433999	NER		NER	Niger	NER
434	434000 - 434999	NGA		NGA	Nigeria	NGA
435	435000 - 435999	RWA		RWA	Ruanda	RWA
436	436000 - 436999	STP		STP	Sao Tome Principe	STP
437	437000 - 437999	SYC		SYC	Seychelles	SYC
438	438000 - 438999	SLE		SLE	Sierra Leone	SLE
439	439000 - 439999	SEN		SEN	Senegal	SEN
440	440000 - 440999	SOM		SOM	Somalia	SOM
441	441000 - 441999	TZA		TZA	Tanzania	TZA
442	442000 - 442999	TGO		TGO	Togo	TGO
443	443000 - 443999	UGA		UGA	Uganda	UGA
444	444000 - 444999	ZMB		ZMB	Zambia	ZMB
445	445000 - 445999	SSD		SSD	South Sudan	SSD
446	446000 - 446999	CPV		CPV	Cape Verde	CPV
447	447000 - 447999	CIV		CIV	Ivory Coast	CIV
448	448000 - 448999	ESH		ESH	Western Sahara	ESH
480	480000 - 480999	ZAF		ZAF	South Africa	ZAF
481	481000 - 481999	NAM		NAM	Namibia	NAM
482	482000 - 482999	BWA		BWA	Botswana	BWA



Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
483	483000 - 483999	ZWE		ZWE	Zimbabwe	ZWE
484	484000 - 484999	MOZ		MOZ	Mozambique	MOZ
485	485000 - 485999	SWZ		SWZ	Swaziland	SWZ
486	486000 - 486999	LSO		LSO	Lesotho	LSO
<b>USA-CANADA (North Americas)</b>						
500	500000 - 500999	USA	GOV	USA-GOV	United States of America - Government USA	USA-GOV
501	501000 - 501999	USA	DC	USA-DC	United States of America - Columbia	US-DC
502	502000 - 502999	USA	AK	USA-AK	United States of America - Alaska	US-AK
503	503000 - 503999	USA	WA	USA-WA	United States of America - Washington	US-WA
504	504000 - 504999	USA	OR	USA-OR	United States of America - Oregon	US-OR
505	505000 - 505999	USA	CA	USA-CA	United States of America - California	US-CA
506	506000 - 506999	USA	ID	USA-ID	United States of America - Idaho	US-ID
507	507000 - 507999	USA	NV	USA-NV	United States of America - Nevada	US-NV
508	508000 - 508999	USA	MT	USA-MT	United States of America - Montana	US-MT
509	509000 - 509999	USA	WY	USA-WY	United States of America - Wyoming	US-WY
510	510000 - 510999	USA	UT	USA-UT	United States of America - Utah	US-UT
511	511000 - 511999	USA	AZ	USA-AZ	United States of America - Arizona	US-AZ
512	512000 - 512999	USA	ND	USA-ND	United States of America - North Dakota	US-ND
513	513000 - 513999	USA	SD	USA-SD	United States of America - South Dakota	US-SD
514	514000 - 514999	USA	NE	USA-NE	United States of America - Nebraska	US-NE
515	515000 - 515999	USA	CO	USA-CO	United States of America - Colorado	US-CO
516	516000 - 516999	USA	NM	USA-NM	United States of America - New Mexico	US-NM
517	517000 - 517999	USA	KS	USA-KS	United States of America - Kansas	US-KS
518	518000 - 518999	USA	OK	USA-OK	United States of America - Oklahoma	US-OK
519	519000 - 519999	USA	TX	USA-TX	United States of America - Texas	US-TX
520	520000 - 520999	USA	AR	USA-AR	United States of America - Arkansas	US-AR
521	521000 - 521999	USA	MN	USA-MN	United States of America - Minnesota	US-MN
522	522000 - 522999	USA	WI	USA-WI	United States of America - Wisconsin	US-WI
523	523000 - 523999	USA	IA	USA-IA	United States of America - Iowa	US-IA
524	524000 - 524999	USA	IL	USA-IL	United States of America - Illinois	US-IL
525	525000 - 525999	USA	MO	USA-MO	United States of America - Missouri	US-MO
526	526000 - 526999	USA	MI	USA-MI	United States of America - Michigan	US-MI
527	527000 - 527999	USA	IN	USA-IN	United States of America - Indiana	US-IN
528	528000 - 528999	USA	OH	USA-OH	United States of America - Ohio	US-OH
529	529000 - 529999	USA	KY	USA-KY	United States of America - Kentucky	US-KY
530	530000 - 530999	USA	AL	USA-AL	United States of America - Alabama	US-AL
531	531000 - 531999	USA	TN	USA-TN	United States of America - Tennessee	US-TN
532	532000 - 532999	USA	LA	USA-LA	United States of America - Louisiana	US-LA
533	533000 - 533999	USA	MS	USA-MS	United States of America - Mississippi	US-MS
534	534000 - 534999	USA	ME	USA-ME	United States of America - Maine	US-ME
535	535000 - 535999	USA	VT	USA-VT	United States of America - Vermont	US-VT
536	536000 - 536999	USA	NH	USA-NH	United States of America - New Hampshire	US-NH
537	537000 - 537999	USA	CT	USA-CT	United States of America - Connecticut	US-CT
538	538000 - 538999	USA	MA	USA-MA	United States of America - Massachusetts	US-MA
539	539000 - 539999	USA	RI	USA-RI	United States of America - Rhode Island	US-RI
540	540000 - 540999	USA	NY	USA-NY	United States of America - New York	US-NY
541	541000 - 541999	USA	NJ	USA-NJ	United States of America - New Jersey	US-NJ
542	542000 - 542999	USA	DE	USA-DE	United States of America - Delaware	US-DE
543	543000 - 543999	USA	PA	USA-PA	United States of America - Pennsylvania	US-PA
544	544000 - 544999	USA	MD	USA-MD	United States of America - Maryland	US-MD
545	545000 - 545999	USA	VA	USA-VA	United States of America - Virginia	US-VA



Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country - State (short)	Country - State (long)	Country - State (CountryName)
546	546000 - 546999	USA	WV	USA-WV	United States of America - West Virginia	US-WV
547	547000 - 547999	USA	NC	USA-NC	United States of America - North Carolina	US-NC
548	548000 - 548999	USA	SC	USA-SC	United States of America - South Carolina	US-SC
549	549000 - 549999	USA	GA	USA-GA	United States of America - Georgia	US-GA
550	550000 - 550999	USA	FL	USA-FL	United States of America - Florida	US-FL
551	551000 - 551999	USA	HI	USA-HI	United States of America - Hawaii	US-HI
552	552000 - 552999	USA	PRI	USA-PR	United States of America - Puerto Rico	US-PR
553	553000 - 553999	USA	GU	USA-GU	United States of America - Guam	US-GU
554	554000 - 554999	USA	AS	USA-AS	United States of America - American Samoa	US-AS
555	555000 - 555999	USA	VIS	USA-VI	United States of America - Virgin Islands	US-VI
556	556000 - 556999	USA	TX	USA-TX	United States of America - Texas	US-TX
557	557000 - 559999	USA	VA	USA-VA	United States of America - Virginia	US-VA
560	560000 - 560999	CAN	FED	CAN-FED	Canada - Federal	CAN-FED
561	561000 - 561999	CAN	BC	CAN-BC	Canada - British Columbia	CA-BC
562	562000 - 562999	CAN	AB	CAN-AB	Canada - Alberta	CA-AB
563	563000 - 563999	CAN	SK	CAN-SK	Canada - Saskatchewan	CA-SK
564	564000 - 564999	CAN	MB	CAN-MB	Canada - Manitoba	CA-MB
565	565000 - 565999	CAN	ON	CAN-ON	Canada - Ontario	CA-ON
566	566000 - 566999	CAN	QC	CAN-QC	Canada - Quebec	CA-QC
567	567000 - 567999	CAN	NS	CAN-NS	Canada - Nova Scotia	CA-NS
568	568000 - 568999	CAN	NB	CAN-NB	Canada - New Brunswick	CA-NB
569	569000 - 569999	CAN	NL	CAN-NL	Canada - Newfoundland Labrador	CA-NL
570	570000 - 570999	CAN	NWT	CAN-NW	Canada - North-West Territories	CA-NT
571	571000 - 571999	CAN	NU	CAN-NU	Canada - Nunavut	CA-NU
572	572000 - 572999	CAN	PEI	CAN-PE	Canada - Prince Edouard Island	CA-PE
573	573000 - 573999	CAN	YU	CAN-YU	Canada - Yukon	CA-YT
580	580000 - 580999	USA	VA	USA-VA	United States of America - Virginia	US-VA
581	581000 - 581999	USA	TX	USA-TX	United States of America - Texas	US-TX
582	582000 - 583999	USA	FL	USA-FL	United States of America - Florida	US-FL
584	584000 - 584999	USA	IL	USA-IL	United States of America - Illinois	US-IL
585	585000 - 585999	USA	NY	USA-NY	United States of America - New York	US-NY
568	586000 - 586999	USA	MNP	USA-MP	United States of America - Northern Mariana Islands	US-MP
<b>South America</b>						
602	602000 - 602999	GTM		GTM	Guatemala	GTM
603	603000 - 603999	BLZ		BLZ	Belize	BLZ
604	604000 - 604999	SLV		SLV	El Salvador	SLV
605	605000 - 605999	NIC		NIC	Nicaragua	NIC
606	606000 - 606999	HND		HND	Honduras	HND
607	607000 - 607999	CRI		CRI	Costa Rica	CRI
608	608000 - 608999	PAN		PAN	Panama	PAN
609	609000 - 609099	CUW		CUW	Curacao	CUW
609	609100 - 609199	ABW		ABW	Aruba	ABW
609	609200 - 609299	SXM		SXM	Sint Maarten	SXM
610	610000 - 610999	MEX	COM	MEX-COM	Mexico - Mexico common	MEX-COM
611	611000 - 611999	MEX	DF	MEX-DF	Mexico - Distrito Federal	MX-DFE
612	612000 - 612999	MEX	FED	MEX-FED	Mexico - Mexico (federal)	MEX-FED
613	613000 - 613999	MEX	AGS	MEX-AGS	Mexico - Aguascalientes	MX-AGU
614	614000 - 614999	MEX	BC	MEX-BC	Mexico - Baja California	MX-BCN
615	615000 - 615999	MEX	BCS	MEX-BCS	Mexico - Baja California Sur	MX-BCS
616	616000 - 616999	MEX	CAMP	MEX-CAM	Mexico - Campeche	MX-CAM
617	617000 - 617999	MEX	CHIS	MEX-CHI	Mexico - Chiapas	MX-CHP

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country - State (short)	Country - State (long)	Country - State (CountryName)
618	618000 - 618999	MEX	CHIH	MEX-CHI	Mexico - Chihuahua	MX-CHH
619	619000 - 619999	MEX	COAH	MEX-COA	Mexico - Coahuila	MX-COA
620	620000 - 620999	MEX	COL	MEX-COL	Mexico - Colima	MX-COL
621	621000 - 621999	MEX	DGO	MEX-DGO	Mexico - Durango	MX-DUR
622	622000 - 622999	MEX	GTO	MEX-GTO	Mexico - Guanajuato	MX-GUA
623	623000 - 623999	MEX	GRO	MEX-GRO	Mexico - Guerrero	MX-GRO
624	624000 - 624999	MEX	HGO	MEX-HGO	Mexico - Hidalgo	MX-HID
625	625000 - 625999	MEX	JAL	MEX-JAL	Mexico - Jalisco	MX-JAL
626	626000 - 626999	MEX	MEX	MEX-MEX	Mexico - Mexico (Etat)	MX-MEX
627	627000 - 627999	MEX	MICH	MEX-MIC	Mexico - Michoacan	MX-MIC
628	628000 - 628999	MEX	MOR	MEX-MOR	Mexico - Morelos	MX-MOR
629	629000 - 629999	MEX	NAY	MEX-NAY	Mexico - Nayarit	MX-NAY
630	630000 - 630999	MEX	NL	MEX-NL	Mexico - Nuevo Leon	MX-NLE
631	631000 - 631999	MEX	OAX	MEX-OAX	Mexico - Oaxaca	MX-OAX
632	632000 - 632999	MEX	PUE	MEX-PUE	Mexico - Puebla	MX-PUE
633	633000 - 633999	MEX	QRO	MEX-QRO	Mexico - Queretaro	MX-QUE
634	634000 - 634999	MEX	QR	MEX-QR	Mexico - Quintana Roo	MX-ROO
635	635000 - 635999	MEX	SLP	MEX-SLP	Mexico - San Luis Potosi	MX-SLP
636	636000 - 636999	MEX	SIN	MEX-SIN	Mexico - Sinaloa	MX-SIN
637	637000 - 637999	MEX	SON	MEX-SON	Mexico - Sonora	MX-SON
638	638000 - 638999	MEX	TAB	MEX-TAB	Mexico - Tabasco	MX-TAB
639	639000 - 639999	MEX	TAMPS	MEX-TAM	Mexico - Tamaulipas	MX-TAM
640	640000 - 640999	MEX	TLAX	MEX-TLA	Mexico - Tlaxcala	MX-TLA
641	641000 - 641999	MEX	VER	MEX-VER	Mexico - Veracruz	MX-VER
642	642000 - 642999	MEX	YUC	MEX-YUC	Mexico - Yucatan	MX-YUC
643	643000 - 643999	MEX	ZAC	MEX-ZAC	Mexico - Zacatecas	MX-ZAC
644	644000 - 644999	MEX	BCF	MEX-BCF	Mexico - Baja California Fronterizo	MEX-BCF
645	645000 - 645999	MEX	CHIHf	MEX-CHI	Mexico - Chihuahua Fronterizo	MEX-CHI
646	646000 - 646999	MEX	SONf	MEX-SON	Mexico - Sonora Fronterizo	MEX-SON
647	647000 - 647999	MEX	TAMPSf	MEX-TAM	Mexico - Tamaulipas Fronterizo	MEX-TAM
651	651000 - 651999	COL		COL	Colombia	COL
652	652000 - 652999	VEN		VEN	Venezuela	VEN
653	653000 - 653999	GUY		GUY	Guyana	GUY
654	654000 - 654999	SUR		SUR	Suriname	SUR
656	656000 - 656999	PER		PER	Peru	PER
657	657000 - 657999	BRA		BRA	Brazil	BRA
658	658000 - 658999	ECU		ECU	Ecuador	ECU
659	659000 - 659999	BOL		BOL	Bolivia	BOL
660	660000 - 660999	PRY		PRY	Paraguay	PRY
661	661000 - 661999	CHL		CHL	Chile	CHL
662	662000 - 662999	ARG		ARG	Argentina	ARG
663	663000 - 663999	URY		URY	Uruguay	URY
665	665000 - 665999	KNA		KNA	St Kitts and Nevis	KNA
666	666000 - 666999	CUB		CUB	Cuba	CUB
667	667000 - 667999	AIA		AIA	Anguilla	AIA
668	668000 - 668999	ATG		ATG	Antigua and Barbuda	ATG
670	670000 - 670999	BHS		BHS	Bahamas	BHS
671	671000 - 671999	BRB		BRB	Barbados	BRB
672	672000 - 672999	BMU		BMU	Bermuda	BMU
673	673000 - 673999	VGB		VGB	British Virgin Islands	VGB
674	674000 - 674999	LCA		LCA	St Lucia	LCA



Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country - State (short)	Country - State (long)	Country - State (CountryName)
675	675000 - 675999	DOM		DOM	Dominican Republic	DOM
676	676000 - 676999	DMA		DMA	Dominica	DMA
677	677000 - 677999	VCT		VCT	St Vincent and Grenadines	VCT
678	678000 - 678999	FLK		FLK	Falkland Islands	FLK
680	680000 - 680999	TCA		TCA	Turks and Caicos	TCA
681	681000 - 681999	TTO		TTO	Trinidad and Tobago	TTO
682	682000 - 682999	GRD		GRD	Grenada	GRD
685	685000 - 685999	HTI		HTI	Haiti	HTI
686	686000 - 686999	JAM		JAM	Jamaica	JAM
687	687000 - 687999	CYM		CYM	Cayman	CYM
693	693000 - 693999	MSR		MSR	Montserrat	MSR
<b>Pacific</b>						
700	700000 - 700999	MHL		MHL	Marshall Islands	MHL
701	701000 - 701999	COK		COK	Cook Islands	COK
703	703000 - 703999	FJI		FJI	Fiji	FJI
705	705000 - 705999	SLB		SLB	Solomon Islands	SLB
706	706000 - 706999	KIR		KIR	Kiribati	KIR
707	707000 - 707999	WSM		WSM	Samoa	WSM
708	708000 - 708999	FSM		FSM	Micronesia	FSM
709	709000 - 709999	NRU		NRU	Nauru	NRU
710	710000 - 710999	TUV		TUV	Tuvalu	TUV
711	711000 - 711999	NIU		NIU	Niue	NIU
712	712000 - 712999	NFK		NFK	Norfolk Island	NFK
713	713000 - 713999	PLW		PLW	Palau	PLW
714	714000 - 714999	PCN		PCN	Pitcairn Island	PCN
<b>ADR</b>						
990	990000 - 990999	UNK		UNK	Unknown	NON_LP
997	997000 - 997099	ADR	LADR	ADR-LADR	ADR - EURADR	ADR-EUR
997	997100 - 997199	ADR	UADR	ADR-UADR	ADR - USAADR	ADR-USA
997	997200 - 997299	ADR	SADR	ADR-SADR	ADR - SAMADR	ADR-SAM
997	997300 - 997399	ADR	CADR	ADR-CADR	ADR - CASADR	ADR-CAS
997	997400 - 997499	ADR	AADR	ADR-AADR	ADR - AUSADR	ADR-AUS
997	997500 - 997599	ADR	IADR	ADR-IADR	ADR - IMOADR	ADR-IMO
998	998000 - 998999	UN		UN	UN	UN
999	999000 - 999099	APS		APS	APS	APS
999	999100 - 999499	ILU		ILU	ILU	ILU
999	999980 - 999989	ADR	A	ADR-A	ADR - A PLATES	ADR-A
999	999990 - 999999	ADR	EADR	ADR-EADR	ADR - EMPTYADR	ADR-EADR

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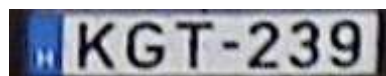
## RETRIEVING COUNTRY NAMES FROM RETURNED PLATE TYPE VALUES FOR LEGACY ENGINES

(FOR ENGINE VERSION 7.2.7.X OR BELOW)

*I. This section only applies to region-specific engines that are version 7.2.7.x or below, excluding USA, Canada, and Australia*

(e.g. *cmanpr-7.2.7.116-latin*)

The type value (T) is a decimal between 100 and 99999. If the type result is divided by 100 the result is the code of the country (C). The remainder defines the subtype (S) within the country. Example: Latin engine



cmNP::type: 111

$C=111/100=1$  defines HUN (Hungary) as country.

The remainder ( $S=111 \bmod 100$ ) =11, refers to the standard, single-row Hungarian EU-plate.

*II. This section only applies to region-specific engines of USA, Canada, and Australia that are version 7.2.7.x or below*

(e.g. *cmanpr-7.2.7.117-usa*)

The type value (T) is a decimal, which is greater than 100000 consisting three main components.

$$T=100000*C+100*F+S$$

Where:

- C - state code within the USA;  $C=T/100000$
- F - Format -a number between 0 and 999- is built up according to the followings:
  - 0-stands for a number in the plate text
  - 1-stands for a letter in the plate text
  - N-stands for the length of the plate text

(in the formula below  $2^N$  equals to the greatest power of 2 below or equal to F)

- B: Decimal value of the plate text's binary format created by the previous rules The

B value can be calculated according to the following formula:  $F=2^N-2+B$

Subtype (S): Serves to distinct plates with the same format within a state (2-digit decimal between 0 and 99)



Example: USA and Canada engine



cmNP::type: 1121701

T=1121701.

$C=T/100000=1121701/100000=11$  defines USA-CA (California).

F=217

Subtype (S)=1,

$F=2^N-2+B$  where N is the greatest power of two below 217, which is 128.  $128=2^7$  so  $N=7$

$217=2^7-2+B$

$217=126+B$

$B=91$  converted to binary: 1011011, so the format of the plate is the following:

'letter number letter letter number letter letter'

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## COUNTRY AND STATE ID'S FOR LEGACY ENGINES


(For ENGINE VERSION 7.2.7.X or below)

(e.g. cmanpr-7.2.7.117-usa)

Country IDs							
1.	HUN	56.	FIN	112.	KGZ	26.	USA-CT
2.	UKR	57.	EST	113.	FRA	27.	USA-OR
3.	RUS	58.	JOR	128.	GBR	28.	USA-NE
4.	LTU	59.	IRN	136.	IRL	29.	USA-WA
5.	CZE	60.	ARE_CD	140.	ZAF	30.	USA-AZ
6.	LVA	61.	ARE_Dubai	142.	IMN	31.	USA-WY
7.	AUT	62.	ARE_AbuDhabi	143.	JEY	32.	USA-KS
8.	DEU	63.	ARE_Ajman	144.	GGY	33.	USA-AL
9.	ROU	64.	ARE_Fujairah	145.	NZL	34.	USA-AK
10.	SVK	65.	ARE_Sharjah	147.	LBY	35.	USA-AR
11.	POL	66.	ARE_UmmalQuwain	163.	URY	36.	USA-DE
12.	NLD	67.	ARE_RasAlKhaimah	164.	GTM	37.	USA-DC
13.	FRA	68.	ARE_Unknown	166.	SLV	38.	USA-HI
14.	TWN	70.	NOR	167.	HND	39.	USA-ID
15.	BRA	71.	LBN	168.	PRY	40.	USA-LA
16.	KOR	72.	ARG	175.	PER	41.	USA-MS
17.	ITA	73.	MCO	176.	MAR	42.	USA-MT
18.	CHL	74.	LIE	180.	CHN	43.	USA-NV
19.	SVN	75.	KAZ	181.	CHN	44.	USA-NH
20.	MLT	76.	MAR	184.	VAT	45.	USA-NM
21.	ESP	77.	SYR	185.	VEN	46.	USA-ND
22.	SGP	78.	HKG	186.	ANT	47.	USA-RI
23.	BIH	79.	GIB	187.	IND	48.	USA-SC
24.	SMR	80.	CHN	188.	VNM	49.	USA-SD
25.	CHE	81.	CHN	189.	BOL	50.	USA-UT
26.	SWE	82.	KOR	208.	IRQ	51.	USA-VT
27.	BEL	83.	EGY	227.	PAK	52.	USA-WV
28.	GBR	84.	KOS	700.	USR	60.	CAN-ON
29.	DNK	85.	ISR			61.	CAN-QC
30.	AND	86.	CRI			62.	CAN-BC
31.	HRV	87.	AUT_OLD	1.	USA-GOV	63.	CAN-MB
32.	SRB	88.	DEU_OLD	2.	USA-IL	64.	CAN-NS
33.	GRC	89.	FRA_NEW	3.	USA-IN	65.	CAN-AB
34.	LUX	90.	MDA	4.	USA-MI	66.	CAN-SK
35.	MYS	91.	MNE	5.	USA-WI	67.	CAN-NB
36.	IRL	92.	TKM	6.	USA-OH	73.	CAN-FED
37.	PRT	93.	MNG	7.	USA-ME		
38.	THA	94.	BWA	8.	USA-TN		
39.	MEX	95.	NAM	9.	USA-MN	1.	AUS-FIS
40.	ZAF	96.	SWZ	10.	USA-PA	2.	AUS-ACT
41.	MKD	97.	ADR	11.	USA-CA	3.	AUS-NT
42.	BGR	98.	UN	12.	USA-FL	4.	AUS-NSW
43.	ALB	99.	UNKNOWN	13.	USA-VA	5.	AUS-QLD
44.	ISL	100.	DEU_TEMP	14.	USA-NY	6.	AUS-SA
45.	NZL	101.	DEU_TEST	15.	USA-TX	7.	AUS-TAS
46.	QAT	102.	DEU_OLDTIMER	16.	USA-IA	8.	AUS-VIC
47.	BLR	103.	DEU_SEASON	17.	USA-OK	9.	AUS-WA
48.	DZA	104.	DEU_TEMP_OLD	18.	USA-CO		
49.	TUR	105.	DEU_TEST_OLD	19.	USA-KY		
50.	GEO	106.	DEU_OLDTIMER_OLD	20.	USA-MO		
51.	COL	107.	DEU_SEASON_OLD	21.	USA-NJ		
52.	SAU	108.	MOZ	22.	USA-GA		
53.	OMN	109.	LSO	23.	USA-MD		
54.	KWT	110.	ZWE	24.	USA-NC		
55.	BHR	111.	AZE	25.	USA-MA		


# RESULT STRUCTURE EXAMPLES

(For engine VERSION 7.3.9.X AND ABOVE)

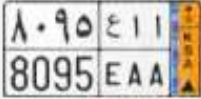
SAMPLE #1 - NUMBER PLATE TYPE FROM HUNGARY				
				
CMANPR RESULT				RESULT FROM
PLATE TYPE	101011			cmNP: type
	RETURNED VALUE	CONVERTED TO BGR	COLOR	
	DECIMAL	HEXADECIMAL	NAME	
CHARACTER COLOR	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR	16777215	0xFFFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR	16777215	0xFFFFFFFF	white	cmNP:color (anpr.GetColor())
NUMBER PLATE TEXT RESULTS				RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1		
NUMBER PLATE (ASCII VERSION)	KGT239	KGT239	cmNP::text	
NUMBER PLATE (UNICODE VERSION)	KGT239			cmNP::wtext


SAMPLE #2 - NUMBER PLATE TYPE FROM CROATIA				
				
CMANPR RESULT				RESULT FROM
PLATE TYPE:	112001			cmNP: type
	RETURNED VALUE	CONVERTED TO BGR	COLOR	
	DECIMAL	HEXADECIMAL	NAME	
CHARACTER COLOR:	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR:	16777215	0xFFFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	16777215	0xFFFFFFFF	white	cmNP:color (anpr.GetColor())
NUMBER PLATE TEXT RESULTS				RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1		
NUMBER PLATE (ASCII VERSION)	V!360GC	V(017D)360GC	cmNP::text	
NUMBER PLATE (UNICODE VERSION)	VŽ360GC			cmNP::wtext

SAMPLE #3 - NUMBER PLATE TYPE FROM CHINA				
				
CMANPR RESULT			RESULT FROM	
PLATE TYPE:	240334		cmNP: type	
	RETURNED VALUE	CONVERTED TO BGR	COLOR	
	DECIMAL	HEXADECIMAL	NAME	
CHARACTER COLOR:	16777215	0xFFFFFFFF	white	cmNP:CHR color
CHARACTER BACKGROUND COLOR:	255	0x0000FF	blue	cmNP:CHR bkcolor
DEDICATED AREA COLOR:	255	0x0000FF	blue	cmNP:color (anpr.GetColor())
NUMBER PLATE TEXT RESULTS				
	If unicode_in_text=0		If unicode_in_text=1	
NUMBER PLATE (ASCII VERSION)	!N719N0	(4eac)N719N0	cmNP:text	
NUMBER PLATE (UNICODE VERSION)	京N719N0		cmNP:wtext	

SAMPLE #4 - A NUMBER PLATE TYPE FROM OMAN				
				
CMANPR RESULT			RESULT FROM	
PLATE TYPE:	215006		cmNP: type	
	RETURNED VALUE	CONVERTED TO BGR	COLOR	
	DECIMAL	HEXADECIMAL	NAME	
CHARACTER COLOR:	0	0x000000	black	cmNP:CHR color
CHARACTER BACKGROUND COLOR:	65535	0x00FFFF	yellow	cmNP:CHR bkcolor
DEDICATED AREA COLOR:	65535	0x00FFFF	yellow	cmNP:color (anpr.GetColor())
NUMBER PLATE TEXT RESULTS				
	If unicode_in_text=0		If unicode_in_text=1	
NUMBER PLATE (ASCII VERSION)	2219RS	2219RS	cmNP:text	
NUMBER PLATE (UNICODE VERSION)	2219RS		cmNP:wtext	



SAMPLE #5 - NUMBER PLATE TYPE FROM SAUDI ARABIA				
				
CMANPR RESULT				RESULT FROM
PLATE TYPE:	210009			cmNP: type
	RETURNED VALUE	CONVERTED TO BGR	COLOR	
	DECIMAL	HEXADECIMAL	NAME	
CHARACTER COLOR:	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR:	16777215	0xFFFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	42495	0x0080FF	orange	cmNP:color (anpr.GetColor())
NUMBER PLATE TEXT RESULTS				RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1	If unicode_in_text=2	
NUMBER PLATE (ASCII VERSION)	!!!!!!	(0668)(0660)(0669) (0665)(0639)(0627) (0627)	8095EAA	cmNP::text
NUMBER PLATE (UNICODE VERSION)	٨٠٩٥ ع ١١			cmNP::wtext

SAMPLE #6 - ADR PLATE TYPE				
				
CMANPR RESULT				RESULT FROM
PLATE TYPE:	997001			cmNP: type
	RETURNED VALUE	CONVERTED TO BGR	COLOR	
	DECIMAL	HEXADECIMAL	NAME	
CHARACTER COLOR:	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR:	16777215	0xFFFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	16777215	0xFFFFFFFF	white	cmNP:color (anpr.GetColor())
ADR PLATE TEXT RESULTS				RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1		
ADR PLATE (ASCII VERSION)	331203	331203		cmNP::text
ADR PLATE (UNICODE VERSION)	331203			cmNP::wtext

SAMPLE #7 - ADR PLATE TYPE				
				
CMANPR RESULT				RESULT FROM
PLATE TYPE:	999999			cmNP: type
	RETURNED VALUE	CONVERTED TO BGR	COLOR	
	DECIMAL	HEXADECIMAL	NAME	
CHARACTER COLOR:				cmNP::CHR color
CHARACTER BACKGROUND COLOR:	16777215	0xFFFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	16777215	0xFFFFFFFF	white	cmNP:color (anpr.GetColor())
ADR PLATE TEXT RESULTS				RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1		
ADR PLATE (ASCII VERSION)			cmNP::text	
ADR PLATE (UNICODE VERSION)			cmNP::wtext	

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## ABBREVIATIONS

### ANPR

Automatic Number Plate Recognition

### ALPR

Automatic License Plate Recognition

### LPR

License Plate Recognition

### ADR

Hazardous Material Identification Code for dangerous goods (also known as Kemler Code). It is an abbreviation derived from the name of the treaty that established it (European Agreement Concerning the International Carriage of **D**angerous Goods by **R**oad).

### EADR

Empty ADR plate, which is an ADR plate without text

### CARMEN®

The brand name of the ARH optical character recognition software family

### CARMEN® FreeFlow

ARH license plate recognition software for free-flowing traffic applications and server applications

### CARMEN® Parking Digital (can also be referred to as CPD)

ARH license plate recognition software for access control and slow-moving traffic applications

### CPD

See **CARMEN® Parking Digital**

### BGR

(Blue, Green, Red) Color code system, it displays pixel layout

### RGB

(Red, Green, Blue) Color code system, it displays pixel layout

### ASCII

American Standard Code for Information Interchange, character-encoding scheme

### API

Application Programming Interface, software library including a set of routines, protocols, and tools for building software applications.

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## DEFINITIONS

### general engine

Recognition engine without country/state identification. Outputs are pure OCR results, where the type (cmNP::type) is always zero (unidentified).

### region-specific engine

Recognition engine with country/state identification. Each engine is tuned to a certain geographic region. Outputs contain a country/state identification value in the cmNP::type member of the result structure. Non-zero type indicates that the country of the license plate was successfully identified during the process. Type=0 refers to an unidentified country or state.

### current engine

Recognition engine currently selected to process input images. It is possible to install multiple engines concurrently on the same system/server, and you can designate any one of those for processing during runtime.

### default engine

Recognition engine selected to process input images by default. It is possible to install multiple engines concurrently on the same system/server, and you can designate any one of those as default.

### engine-dependent value

Property value that may be different for each engine release. Obtain the value of the given property by calling the GetProperty() function.

## SYMBOLS

{0,1,2,4,5} braces mean that the property can only assume one of the discrete values listed inside  
[16..25] brackets mean that the property can assume one of the integer values within the listed range

### cmNP

Output structure of the cmAnpr development library

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Adaptive Recognition Technical Support System ([ATSS](#)) is designed to provide you the fastest and most proficient assistance, so you can quickly get back to business.

Information regarding hardware, software, manuals and FAQ are easily accessible for customers who previously registered to enter the dedicated ATSS site. Besides offering assistance, the site is also designed to provide maximum protection while managing your business information and technical solutions utilized.

### New User

If this is your first online support request, please create an account by clicking on this [link](#).

### Returning User

All registered ATSS customers receive a personal access link via e-mail. If you previously received a confirmation message from ATSS, it contains the embedded link that allows you to securely enter the support site.

If you need assistance with login or registration, please contact [atsshhelp@adaptiverecognition.com](mailto:atsshhelp@adaptiverecognition.com) for help.