

version 2.8

# AutoCode Intellect

## User Guide



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raising technologies™

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# 1. Introduction

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## 1.1. Autocode Intellect Overview

AutoCode Intellect is a software module for the Intellect CCTV System. The following features are available within the module:

- License plate recognition.
- Recognition of up to 10 plates in the same frame.
- Recognition fine tuning: license plate pattern selection, control over quality and parameters of resulting images.
- Ability to set multiple license plate detection zones within one frame.
- Distributed processing and storage of recognition cases within the module's database.
- Adjustment of cases and media storage time: control over depository volume.
- External database check for recognized license plates.
- Alerts creation and management within preset algorithms.
- Reading recognition server coordinates from a GPS receiver.

## 1.2. About this manual

This manual is designed for users of the Intellect system with Operator access rights who are responsible for the operation of interface objects of AutoCode Intellect. This manual contains a detailed description of VM functional module (client application of AutoCode Intellect):

- The “**Interfaces**” section contains descriptions of all UI elements presented in **Recognition protocol** and **Recognition display** windows.
- The “**Operation**” section focuses on basic use cases.

Installation, license activation and updating, as well as setting up AutoCode Intellect and administration procedures are described in the AutoCode Intellect System Administrator's Guide.

# 2. AutoCode Intellect Interfaces

## Contents

- 2.1. Events
- 2.2. Recognition protocol
- 2.3. Filters
- 2.4. Recognition display

### 2.1. Events

The Event with the AutoCode Intellect software module is the fact of recognizing the license plate of the vehicle that appeared in the view of CCTV camera, as well as any actions concerning the license plate number (for example, adding or editing).

Table 1 contains the classification of the events based on states assigned to them either manually or automatically.

Table 1 — Events classification

State	Event
Regular state	A license plate is recognized. It does not belong to the wanted list.
New alarm	<ul style="list-style-type: none"><li>• A license plate is recognized. It's included in the wanted list (automatic alert).</li><li>• The operator manually initiated an alert on the recognized license plate (manual alert).</li></ul>
Failed alarm	The operator cancelled an alert on the recognized license plate.
Received alarm	The operator received an alert on the recognized license plate for processing.
Closed alarm	The alert on the recognized license plate is no longer valid.

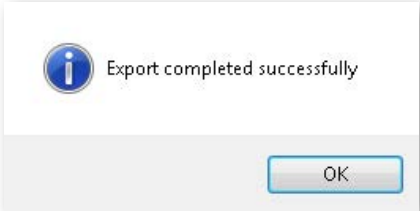
Instructions on events processing can be found in 3.3. [Events processing](#) sub-section.

### 2.2. Recognition protocol

Recognition protocol is an interface window that displays the information about recognized license plates (events) as a records register (Fig. 1). Recognition protocol window (See Table 2) provides events processing and tracking vehicles that are currently in the wanted list.

Table 2 — Elements of Recognition protocol window

Group of elements	Function
1. Recognition protocol window title	Displays the name of the recognition protocol, e.g. <i>Recognition protocol 1</i> .

Group of elements	Function
<p>2. <b>Add/Edit number</b> button</p>	<ul style="list-style-type: none"> <li>• <b>Add number</b> button activates the form for adding the number to the recognition protocol. The button is available if none of the numbers in the list is selected.</li> <li>• <b>Edit number</b> button activates the form for editing numbers selected in recognition protocol. The button is available if a number is selected in the list (Fig. 2).</li> </ul> <p>These buttons are only available to the operator if he has the rights to edit numbers. Instructions on how to add and edit numbers can be found in <a href="#">3.1. Adding numbers</a> and <a href="#">3.2. Editing numbers</a> sub-sections respectively.</p>
<p>3. <b>Events list</b></p>	<p>The list contains the records register of the events added to the database by AutoCode recognition module.</p> <p>The following information is available for each event on the list:</p> <ol style="list-style-type: none"> <li>a) A picture of the vehicle from which the number was recognized.</li> <li>b) Name of the camera tracking the vehicle to recognize the number.</li> <li>c) Recognized number.</li> <li>d) Recognition time and date.</li> <li>e) A segment of the frame that contains an image of the license plate.</li> </ol>
<p>4. <b>Buttons panel</b></p>	<ul style="list-style-type: none"> <li>• <b>Wanted</b> button switches the recognition protocol to viewing “Wanted” events.</li> <li>• <b>History</b> button switches the recognition protocol to viewing “History” events.</li> <li>• <b>Filter</b> button opens the Filter window to search for events by one or various filtering criteria.</li> </ul> <p>Viewing modes and filtering criteria are described in <a href="#">2.3. Filters</a> sub-section.</p> <ul style="list-style-type: none"> <li>• <b>Alarm</b> button assigns “Alarm” status to the event. Both audio and visual alerts are activated once this button is clicked.</li> <li>• <b>Accept</b> and <b>Cancel</b> buttons process the alarm by assigning “Received” or “Cancelled” status to it respectively. These buttons are only available if an alarm event is selected in the list.</li> <li>• <b>Close</b> button changes status of the alarm from “Received” to “Closed”. This button is only available if a received alarm is selected in the recognition protocol.</li> </ul> <p>Events processing is described in <a href="#">3.3. Events processing</a> sub-section.</p> <ul style="list-style-type: none"> <li>• <b>Export</b> button opens a window for saving the active list as either HTML or CSV file. Both general and filtered lists are available for export. No actions should be applied to the file until the successful export is confirmed.</li> </ul> <div data-bbox="836 1854 1257 2063" style="text-align: center;">  </div>

Group of elements	Function
5. Counters panel	<ul style="list-style-type: none"> <li>• <b>Number of entries</b> shows the current amount of events in the recognition protocol.</li> <li>• <b>Selected entries</b> shows the amount of selected events in the recognition protocol.</li> </ul>
6. System time	Shows current time.

Figure 1 — Recognition protocol window

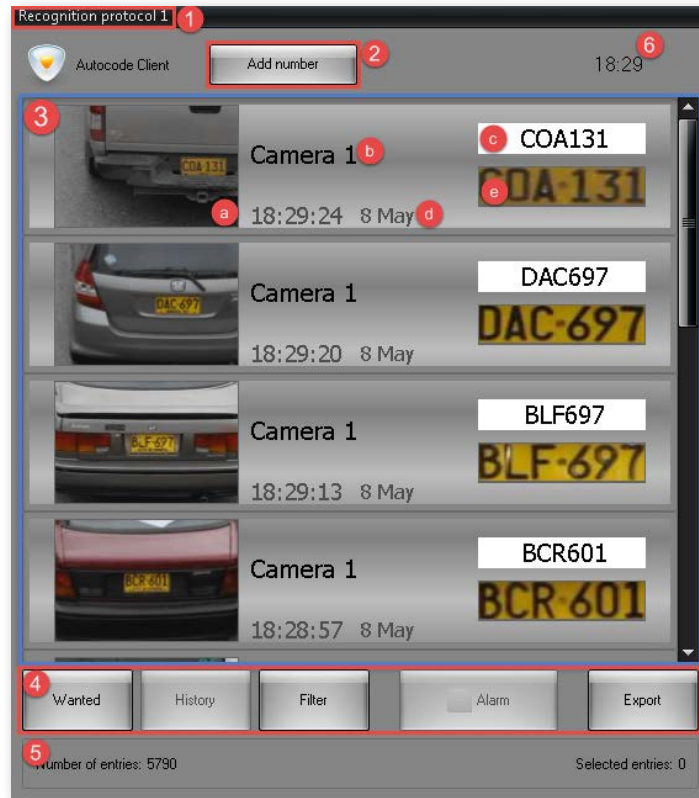
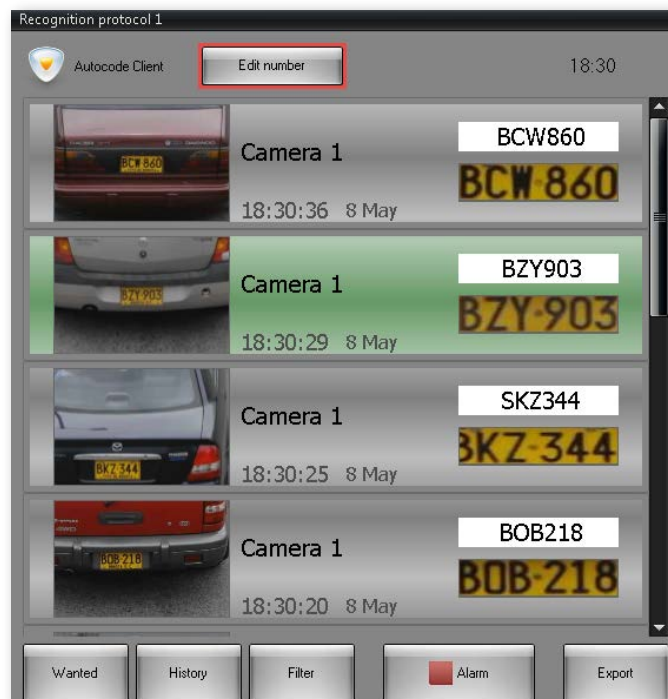


Figure 2 — Displaying Edit number button when an event is selected in recognition protocol



Each recognition event has a specific color assigned to it to highlight the recognized number (Table 3).

**Table 3 — Recording recognized numbers: colors**

Color	Meaning
White BZY903	<ul style="list-style-type: none"> <li>• Regular event</li> <li>• Failed alarm</li> <li>• Closed alarm</li> </ul>
Red BZY903	New alarm (automatic or manual)
Yellow BZY903	Received (processed) alarm

A double-click on the event in recognition protocol opens the numbers archive in **Monitor** window (Fig. 3). This action is not available if the archive recording was not activated by the administrator.

**Figure 3 — Monitor in archive mode**



Viewing various archive types in monitor is described in the Intellect System Operator's Guide.

## 2.3. Filters

Search and filtering operations are carried out to simplify working with vast amounts of data.

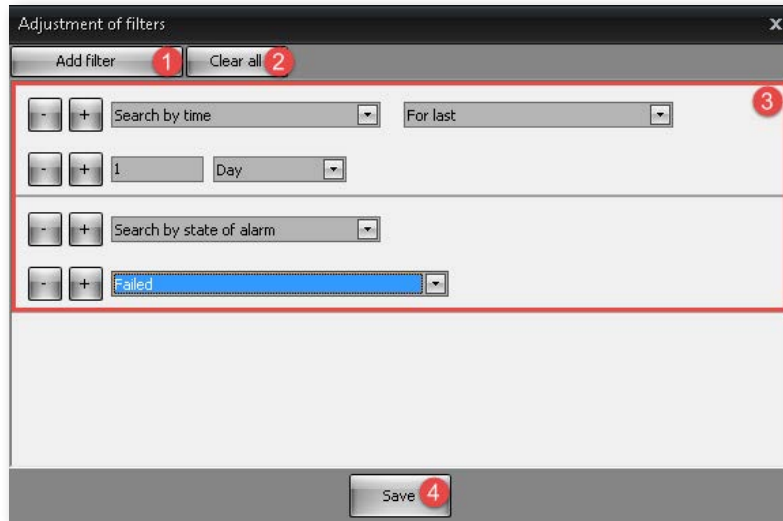
The difference between the two types of operations is conditional. While search aims to locate a single specific event in the list, filtering is aimed at creating a specific list of events. In both cases, the selection may be carried out using one or many parameters and both cases utilize **Adjustment of filters** window that is activated by clicking **Filters** button in recognition protocol (Fig. 4).

The structure of **Adjustment of filters** window is presented in [Table 4](#).

Each filter ([Fig. 5a](#)) has its own set of filtering criteria ([Fig. 5b](#)). Their connection is presented in [Table 5](#).

Detailed instructions for filtering can be found in [3.4. Filtering](#) sub-section.

**Figure 4 — Adjustment of filters window**



**Table 4 — Elements of Adjustment of filters window**

Element	Function
1. <b>Add filter</b> button.	Creates a new filter.
2. <b>Clear all</b> button.	Cancel filtration by current parameters and closes filtration window.
3. Filters list	List of criteria used to filter events in recognition database.
4. <b>Save</b> button	Confirms selected filters and closes <b>Adjustment of filters</b> window. After clicking this button, only the events that match filtering conditions will be shown in recognition protocol.

**Figure 5 — Adjustment of filters window: available filters and filtering criteria**





**Table 5 — Filters and filtering criteria**

Filter (a)	Filtering criteria (b)
<p><b>1. Search by license plate</b></p>	<ul style="list-style-type: none"> <li>• <b>Matches</b> — selecting license plates that completely match inserted value.</li> <li>• <b>Begins with</b> — selecting license plates that have first characters matching specified symbols.</li> <li>• <b>Ends with</b> — selecting license plates that have last characters matching specified symbols.</li> <li>• <b>By license plate fragment</b> — selecting license plates that contain the specified string of characters.</li> <li>• <b>Contains</b> — selecting license plates that contain all specified symbols even if there are other symbols between specified ones.</li> <li>• <b>Resembles the template</b> — selecting license plates that differ from the template within the set amount of characters.</li> </ul>
<p><b>2. Search by time</b></p>	<ul style="list-style-type: none"> <li>• <b>Last</b> — selecting the events created within a specified period of time before the filter was activated. Available units are “days”, “weeks”, “months” and “years”. Maximum available value is 365.</li> <li>• <b>On the date</b> — selecting the events created on the specified date and time.</li> <li>• <b>Before</b> — selecting the events created before the specified date.</li> <li>• <b>After</b> — selecting the events created after the specified date and time.</li> <li>• <b>Between</b> — selecting the events created within a specified period of time.</li> </ul>
<p><b>3. Search by name of channel</b></p>	<p>Selects the events created by the AutoCode recognition module processing the videostream from the specific camera.</p>
<p><b>4. Search by state of alarm</b></p>	<ul style="list-style-type: none"> <li>• <b>New</b> — selecting new alarms.</li> <li>• <b>Failed</b> — selecting failed alarms.</li> <li>• <b>Received</b> — selecting received alarms.</li> <li>• <b>Closed</b> — selecting closed alarms.</li> <li>• <b>No alarm</b> — selecting the events that have no alarms attached to them.</li> </ul>
<p><b>5. Direction</b></p>	<p>Selects the recognition events of the vehicles that were moving if the direction specified for filtering.</p> <p>This filter is used when the vehicles are moving in various directions within the frame. In filtering parameters each direction (from the point of camera’s view) is marked using general directions:</p> <ul style="list-style-type: none"> <li>• <b>N (North)</b> — vehicles move away from the camera.</li> <li>• <b>S (South)</b> — vehicles move towards the camera.</li> <li>• <b>W (West)</b> — vehicles move from right to left.</li> <li>• <b>E (East)</b> — vehicles move from left to right.</li> </ul> <p>Additionally, the middle values are available: <b>NW</b> (North-West), <b>NE</b> (North-East), <b>SW</b> (South-West) and <b>SE</b> (South-East). The <b>UNK</b> value is set for the events when the direction was not determined.</p>

**Note!** Clicking  button next to the name of the filter adds another filter to the **Adjustment of filters** window (same as the **Add filter** button). Clicking similar button next to the filtering criteria selection field (Fig. 5) allows assigning multiple filtering criteria to one filter.  buttons work in a similar way deleting selected filters or filtering criteria.

For the convenience of the user, recognition protocol has two modes of displaying events that correspond to preset filtering criteria (Table 6).

**Table 6 — Events displaying modes in recognition protocol**

Mode	Features
<b>Wanted</b> (Fig. 6)	<p>Activated by clicking the <b>Wanted</b> button (click the <b>Wanted</b> button again to deactivate this mode).</p> <p>The events are filtered by the state of the alarm “New” which results in displaying the license plates that belong to the “Wanted” list.</p>
<b>History</b> (Fig. 7)	<p>Activated by clicking the <b>History</b> button available if a number is selected in recognition protocol (click the <b>History</b> button again to deactivate this mode).</p> <p>The events are filtered by the license plate (“Matches”) which results in displaying all events for the selected number.</p>

**Figure 6 — Recognition protocol window in Wanted mode**

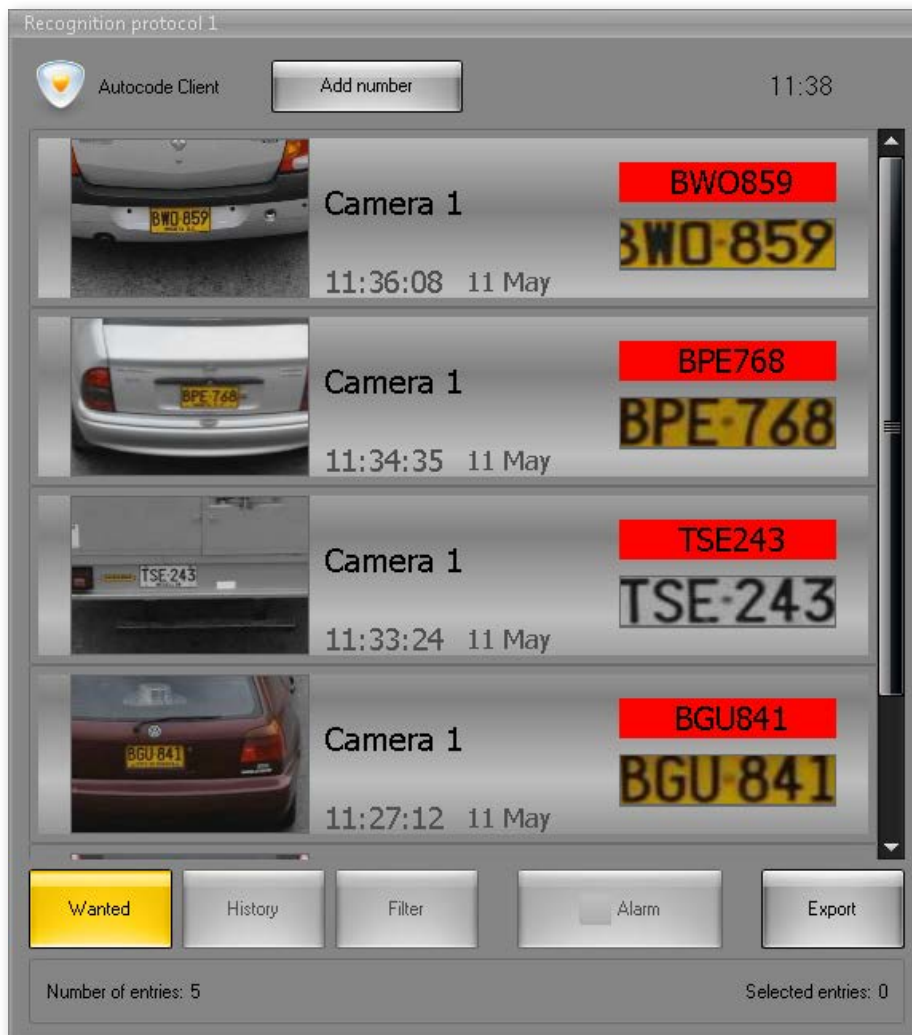
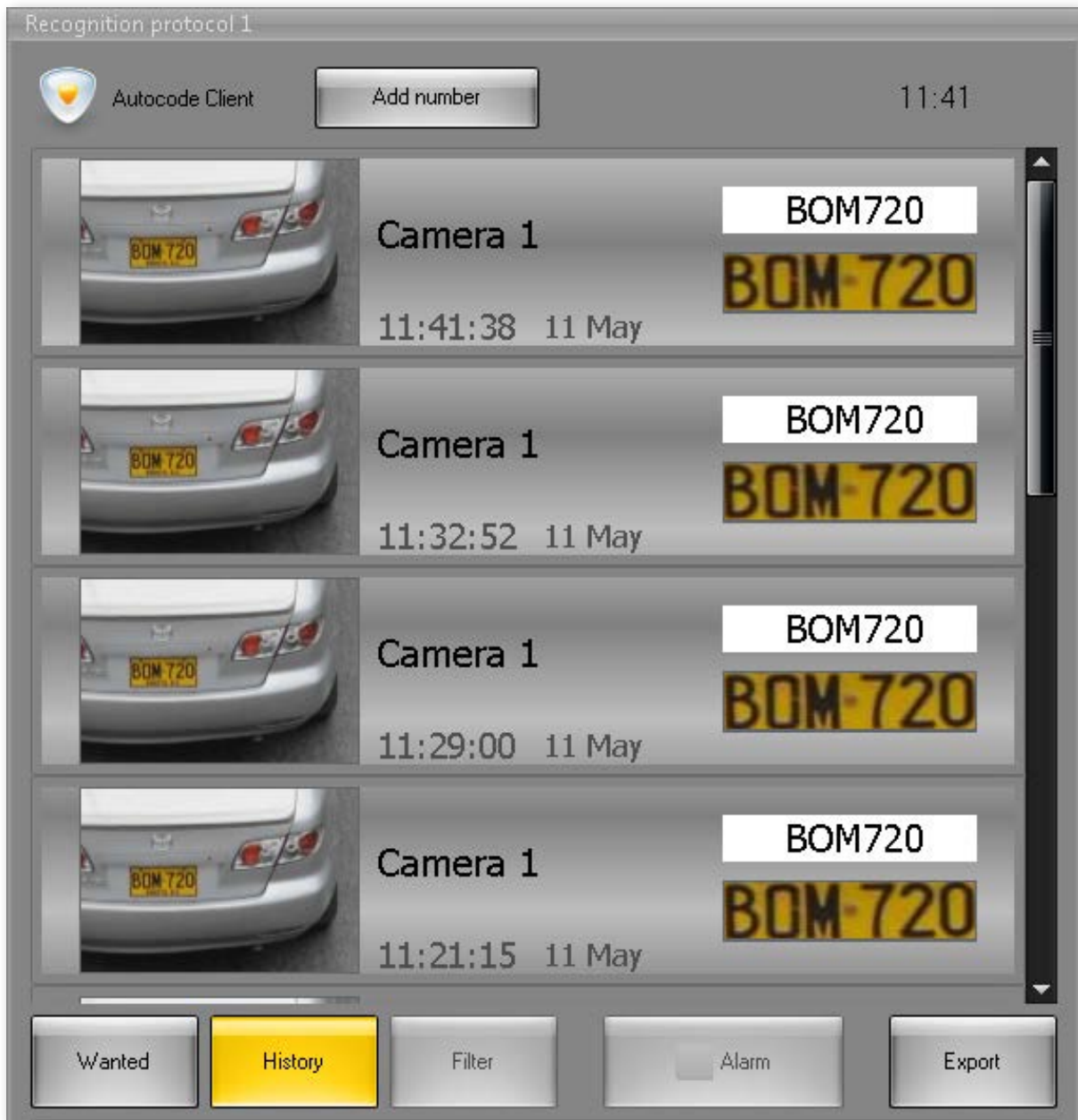


Figure 7 — Recognition protocol window in History mode



## 2.4. Recognition display

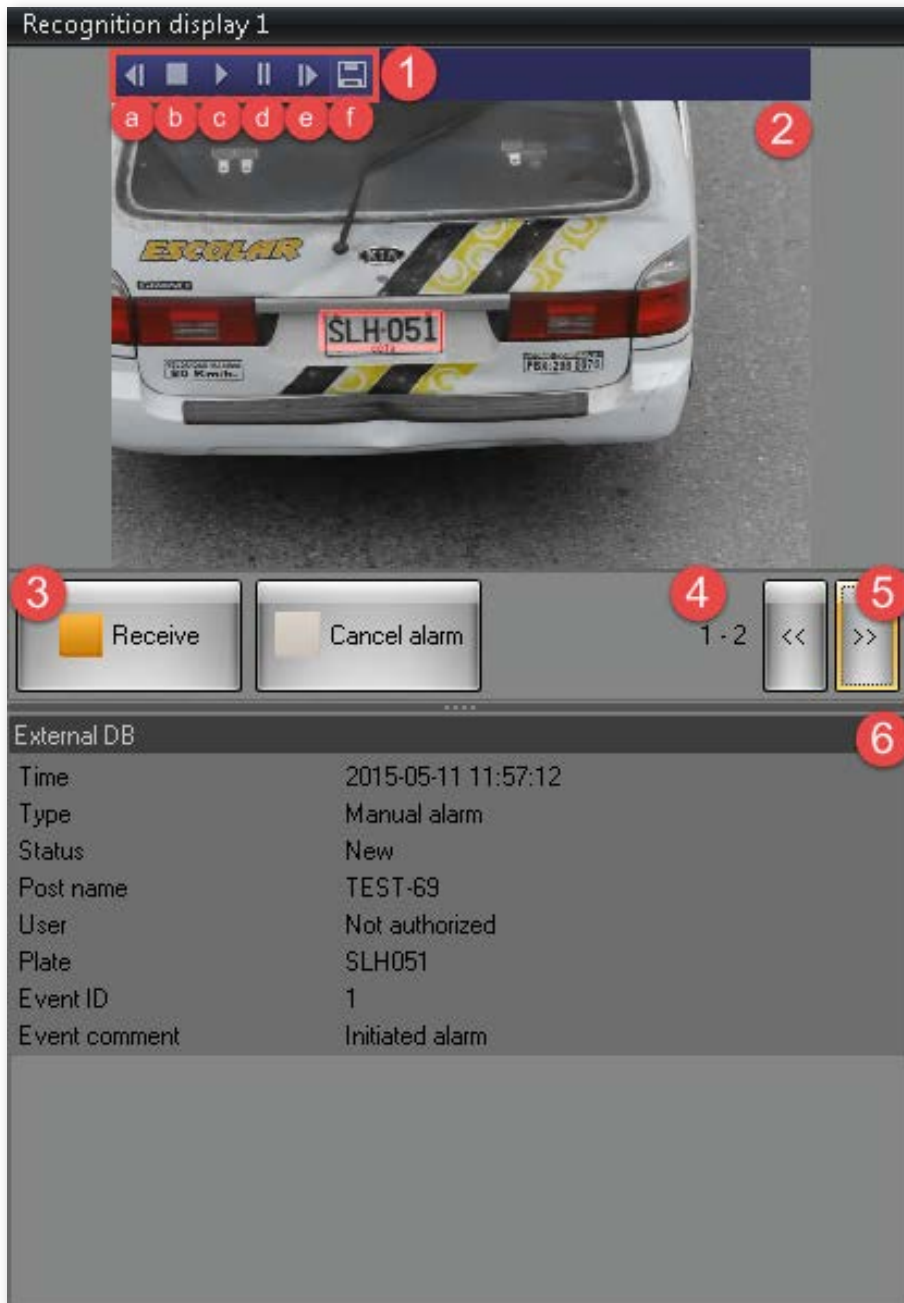
Recognition display is an interface window for viewing additional information about a recognition event (its state, comments from operators, metadata and external database information). A video-archive for selected recognition events is available in recognition display as well.

When no events are selected in recognition protocol, the recognition display may automatically show the image of the last recognized license plate (Fig. 8). If a new event is created, the information about the license plate and the best shot of it are updated automatically. If this feature was not activated by the system administrator, license plate information in recognition display will be updated only when the event is selected in recognition protocol.

Figure 8 — Displaying the frame with last recognized license plate in Recognition display window



Figure 9 — Recognition display window



The set of elements in Recognition display window (Fig. 9) depends on the state of the event selected in Recognition protocol (Tables 7 and 8).

Table 7 — Elements of Recognition display window displayed based on the state of the event

State	Elements of Recognition display
Regular event	<ul style="list-style-type: none"> <li>1. Video-archive controls</li> <li>2. Image of selected number/Video-archive viewer</li> <li>3. <b>Alarm</b> button</li> <li>5. Event details: no records</li> </ul>
New	<ul style="list-style-type: none"> <li>1. Video-archive controls</li> <li>2. Image of selected number/Video-archive viewer</li> <li>3. <b>Receive</b> and <b>Cancel</b> buttons</li> <li>4. Unprocessed alarms counter for <b>Wanted</b> events display mode.</li> </ul>

State	Elements of Recognition display
New	5. Unprocessed alarms navigation buttons for <b>Wanted</b> events display mode 6. Event details
Received	1. Video-archive controls 2. Image of selected number/Video-archive viewer 3. <b>Receive</b> and <b>Cancel</b> buttons 6. Event details
Failed	1. Video-archive controls 2. Image of selected number/Video-archive viewer 3. <b>Alarm</b> button 6. Event details
Closed	1. Video-archive controls 2. Image of selected number/Video-archive viewer 3. <b>Alarm</b> and <b>Close</b> buttons 6. Event details

**Table 8 — Elements of Recognition display window**

Element	Function
1. Video-archive controls	Managing video-archive playback: <ul style="list-style-type: none"> <li>a) Shows the previous frame of the video.</li> <li>b) Stops video-archive playback.</li> <li>c) Plays the fragment of the video with the moving vehicle that has its license plate recognized (a respective event must be selected in Recognition protocol).</li> <li>d) Stops video playback. Play button should be clicked to continue..</li> <li>e) Shows the next frame of the video.</li> <li>f) Opens a window to save current frame as JPG file.</li> </ul>
2. Image of selected number/Video-archive viewer	Showing the best image of recognized license plate (when the event is selected in Recognition protocol). There's a feature to play a video of the vehicle moving across the camera view. Click <b>Play</b> to watch the video.
3. Events processing buttons	<ul style="list-style-type: none"> <li>• <b>Alarm</b> button initiates an alarm on selected event by switching its state from "Regular" to "New".</li> <li>• <b>Receive</b> button switches the state of initiated alarm from "New" to "Received".</li> <li>• <b>Cancel</b> button switches the state of initiated alarm from "New" to "Failed".</li> <li>• <b>Close</b> button switches the state of Received alarm from "Received" to "Closed".</li> </ul> <p>Instructions on events processing can be found in <a href="#">3.3. Events processing</a> sub-section.</p>
4. Unprocessed alarms counter	Showing the number of the selected event from the total of alarms in the recognition database. Unprocessed alarms counter is available after switching a Recognition protocol to <b>Wanted</b> mode.
5. Unprocessed alarms navigation buttons	<ul style="list-style-type: none"> <li>• &gt;&gt; — button shows the next event from the unprocessed alarms list in Recognition display.</li> <li>• &lt;&lt; — button shows the previous event from the unprocessed alarms</li> </ul>

Element	Function
	<p>list in Recognition display.</p> <p>Unprocessed alarms navigation buttons are available in Recognition display after switching a Recognition protocol to <b>Wanted</b> mode.</p>
<p><b>6. Event details</b></p>	<p>Showing information about the state of the event, comments and reactions from operators, number modifications (if modified) and metadata from external databases.</p> <p>If no alarms were initiated on a license plate, no data will be shown in this section of Recognition display.</p> <p>When the event changes state from regular to alarm, an information card for the change of state is created. Each subsequent change (to a “Failed”, “Received” or “Closed” state) is also saved as a card in Recognition display.</p> <p>Number of cards depends on number of changes.</p> <p>Each information card contains the following data:</p> <p><b>Time</b> — date and time when the state was changed.</p> <p><b>Type</b> — operator reaction type, e.g. “Manual alarm” or “Closed”.</p> <p><b>Status</b> — the state described in the card.</p> <p><b>Post name</b> — name of the CCTV post that recorded and recognized the license plate.</p> <p><b>User</b> — user name.</p> <p><b>Plate</b> — recognized license plate.</p> <p><b>Event ID</b> — state identifier.</p> <p><b>Event comment</b> — comment on changing to current state; comprised of two parts: obligatory (created automatically based on operator reaction, e.g. “Initiated alarm” or “Called for a team”) and additional (may be filled by operator during processing).</p> <p>Additional information may be present in Recognition display when the data from external databases is exported to the connected Recognition protocol.</p>

# 3. AutoCode Intellect Operation

## Contents

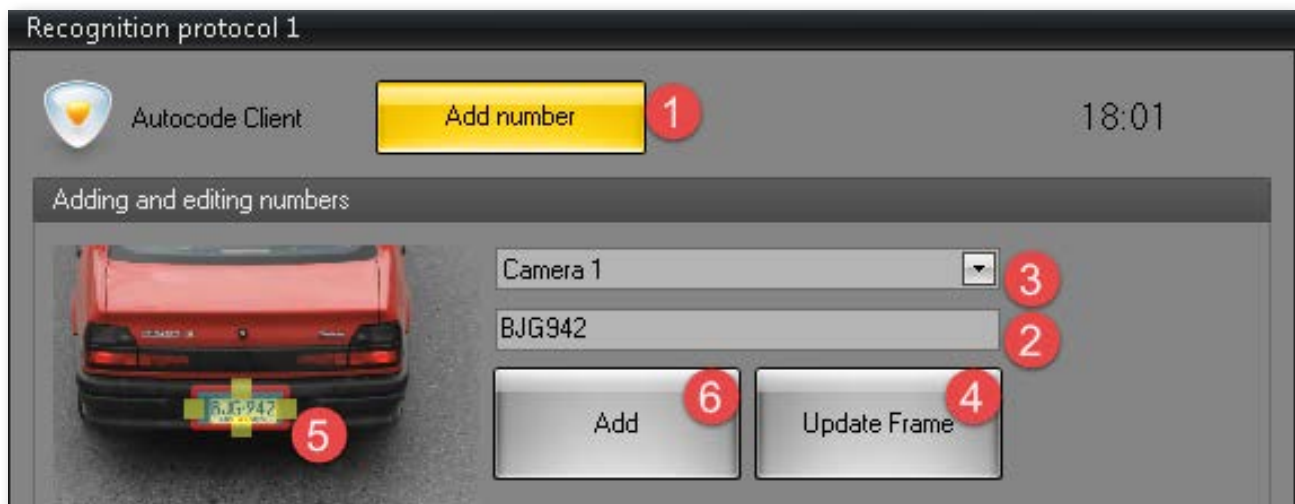
- 3.1. Adding number
- 3.2. Editing number
- 3.3. Events processing
  - 3.3.1. Alarm button
  - 3.3.2. Accept button
  - 3.3.3. Dismiss button
- 3.4. Filtering

### 3.1. Adding number

License plate numbers may be added to the recognition protocol manually if appropriate rights are enabled. To do that (Fig. 10):

- click **Add number** (1) in recognition protocol window.
- insert the license plate number (2) into a text field under a dropdown.
- select the camera that follows the vehicle (3) from the dropdown (if applicable).
- click **Update Frame** (4) button if a current image of the license plate needs to be added to the database.
- place a special frame (5) over the license plate on the image (the frame may be adjusted).
- click **Add** (6) to confirm a new number or click **Add number** (1) again to cancel.

Figure 10 — Add number form





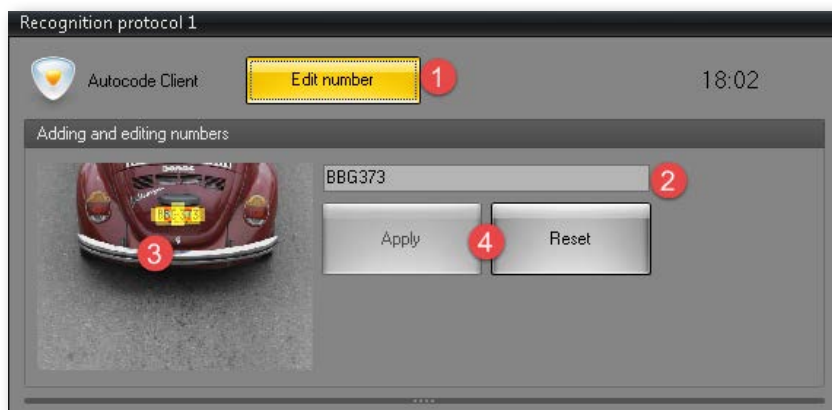
## 3.2. Editing number

Recognized license plate numbers in the recognition protocol may be edited if appropriate rights are enabled. This requires one or more numbers to be selected in recognition protocol. Once the number(-s) is selected, the following actions are to be done (Fig. 11):

- click **Edit number** (1).
- make the modifications (2) in the edit number form that appears.
- adjust the frame over the license plate (3) if necessary.
- click **Apply** (4) to confirm the modifications, click **Reset** to revert changes or **Edit number** to cancel number editing.

**Note!** If several numbers are selected in the recognition protocol, the changes will be applied to all of them.

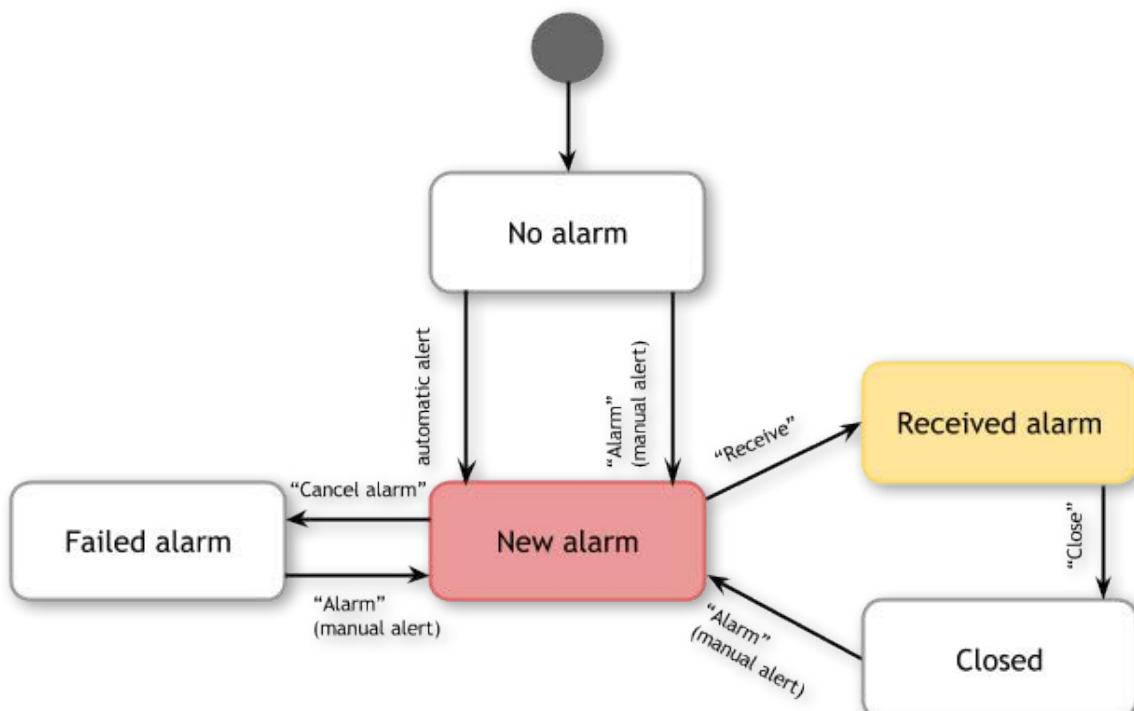
Figure 11 — Edit number form



## 3.3. Events processing

The open alarm state “New” may be assigned either automatically (if external wanted databases are connected) or manually. This sub-section contains the description of manual events processing (Fig. 12).

Figure 12 — Events processing chart



### 3.3.1. Alarm button

To manually initiate an alarm on recognized license plate (Fig. 13):

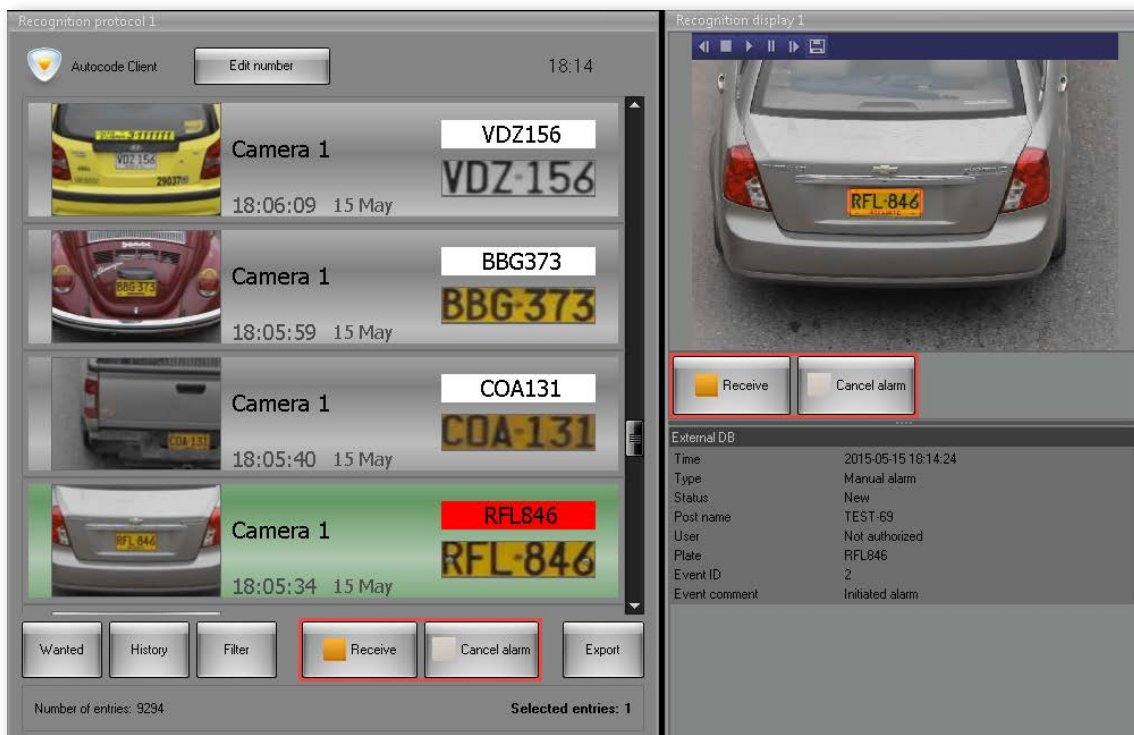
- select the corresponding event in recognition protocol (1);
- click **Alarm** in recognition protocol (2a) or recognition display (2b).

Figure 13 — Initiating alarm manually



Once the alarm is initiated, **Receive** and **Cancel alarm** buttons will appear in both recognition protocol and recognition display (Fig. 14).

Figure 14 — Event processing buttons



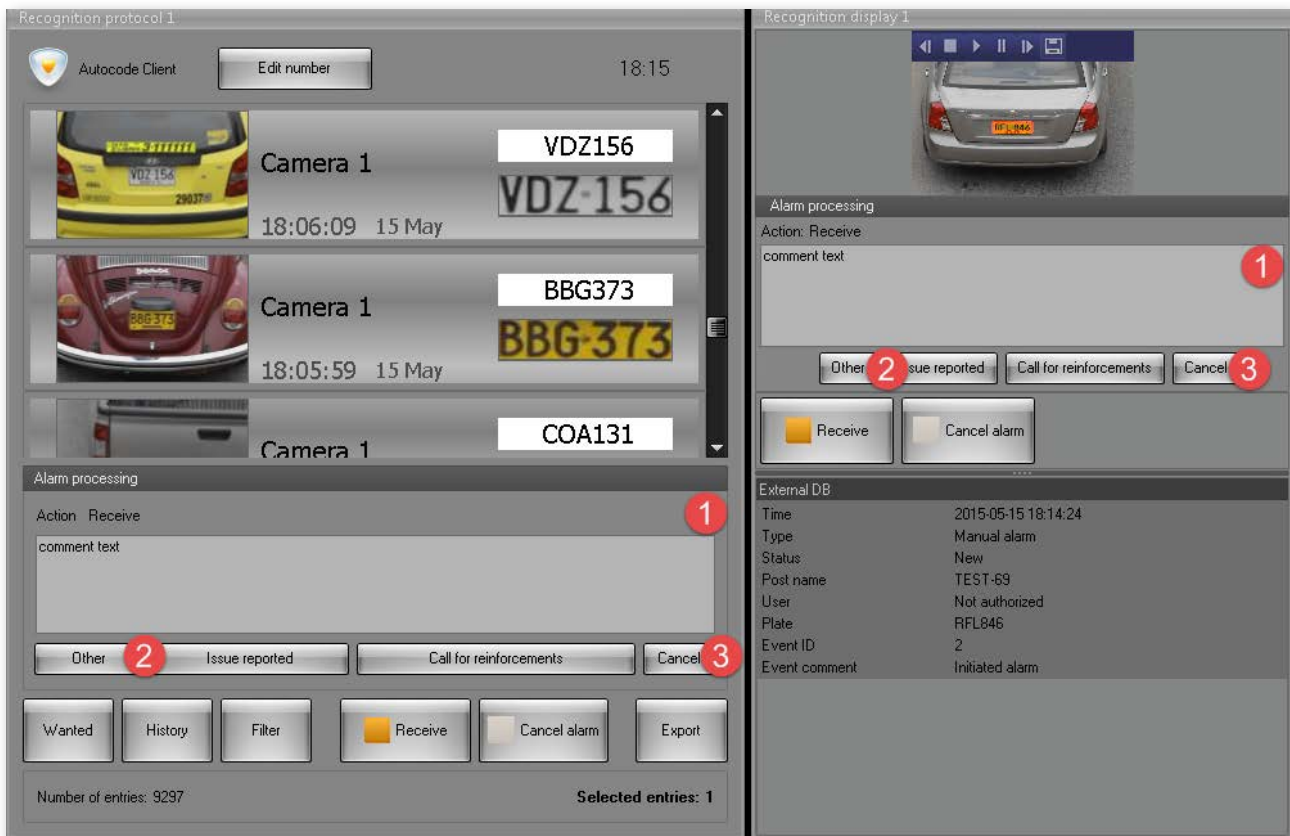
To display all unprocessed events (that have “New” status) in recognition protocol, click **Wanted** button (see 2.2. [Recognition protocol](#)). When the recognition protocol switches to Wanted mode, the unprocessed alarms counter becomes available (see 2.4. [Recognition monitor](#)).

### 3.3.2. Receive button

This button starts alarm processing. It opens the alarm processing form ([Fig. 15](#)) that appears in either recognition protocol or recognition display depending on where the button was clicked. The form contains the following elements:

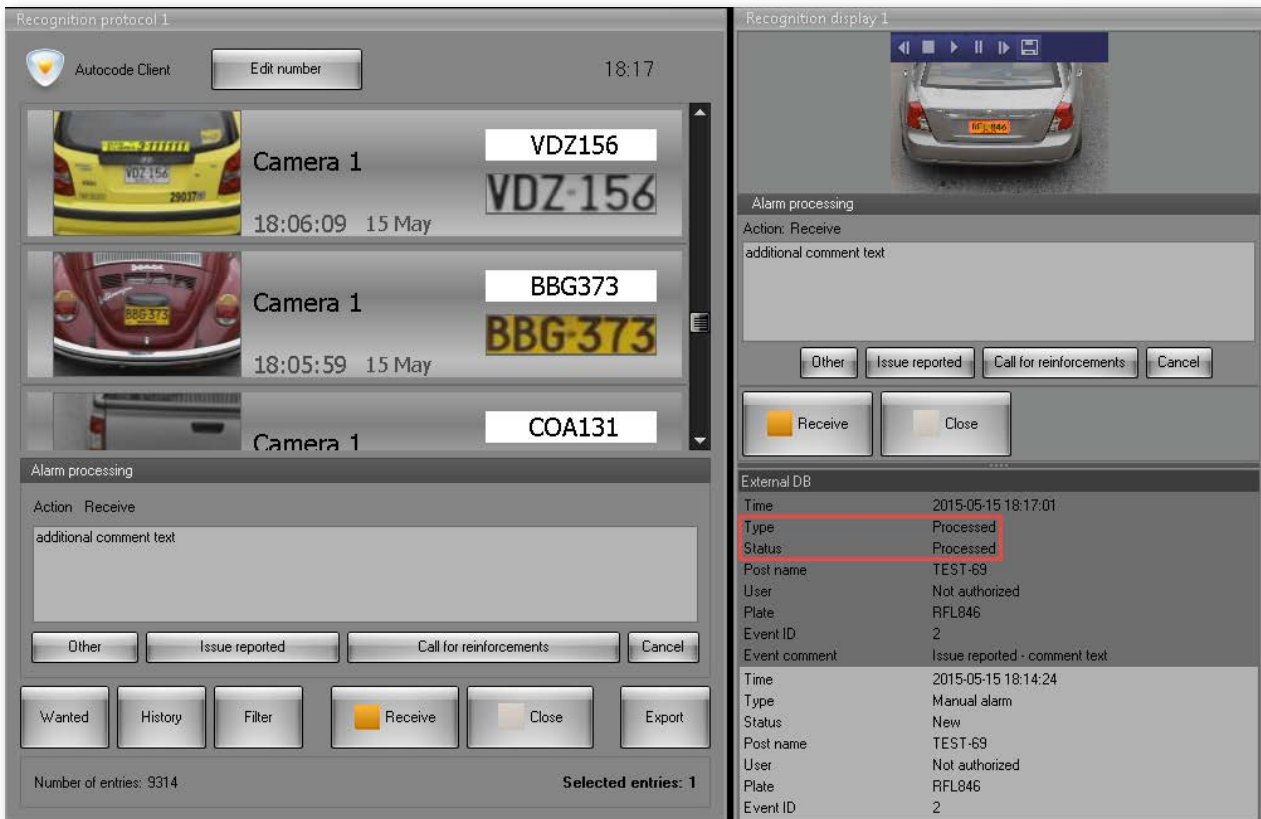
- **Comment field (1)** — a text field that may be used by operator to comment on the processed event.
- **Other, Issue reported, Call for reinforcement buttons (2)** — preset options for the reaction of the operator during the processing of an event (selected based on his job description).
- **Cancel button (3)** closes the alarm processing form leaving the event with “New” status.

**Figure 15 — Alarm processing form**



If an additional comment or reaction on the already-received alarm needs to be created, click **Receive** again when the event is selected ([Fig. 16](#)).

Figure 16 — Adding new information to a received alarm



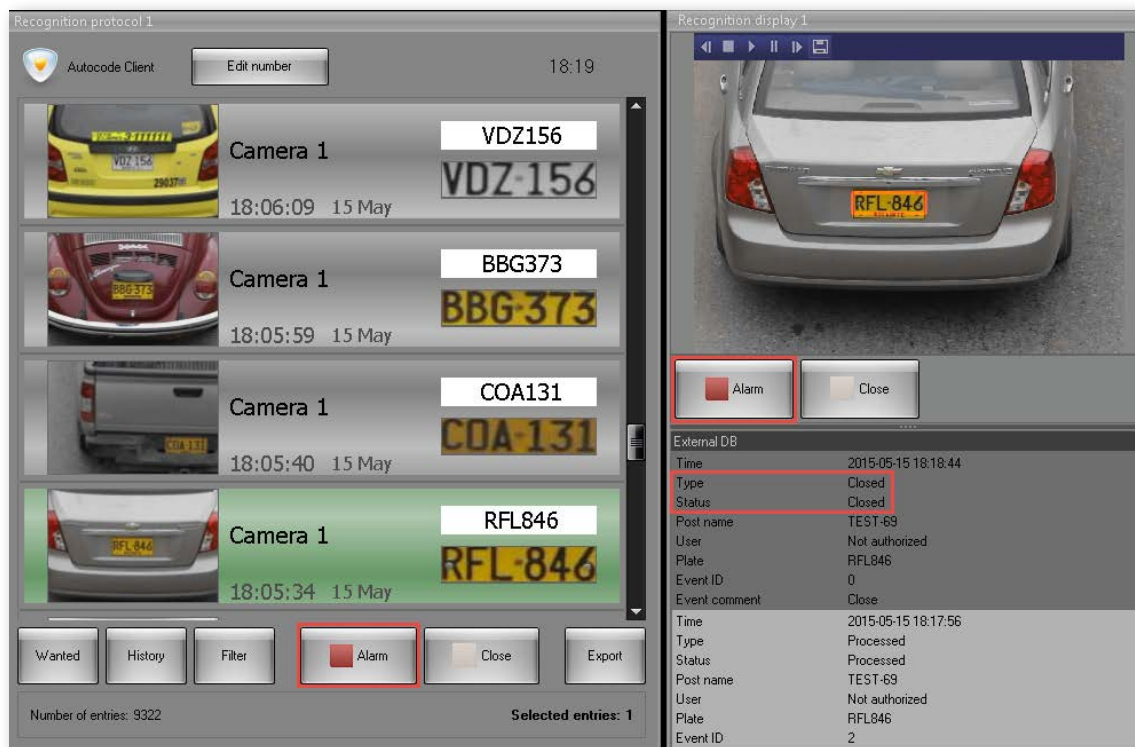
After the alarm is received, Close button becomes available (Fig. 17). Click it to assign the “Closed” status to the received alarm.

Figure 17 — Alarm closing



A new alarm may be initiated for a closed event (Fig. 18).

Figure 18 — Initiating a new alarm after it was closed



### 3.3.3. Cancel button

This button changes the status of the event from **New** to Failed. It opens the alarm cancelling form (Fig. 19) that appears in either recognition protocol or recognition display depending on where the button was clicked. The form contains the following elements:

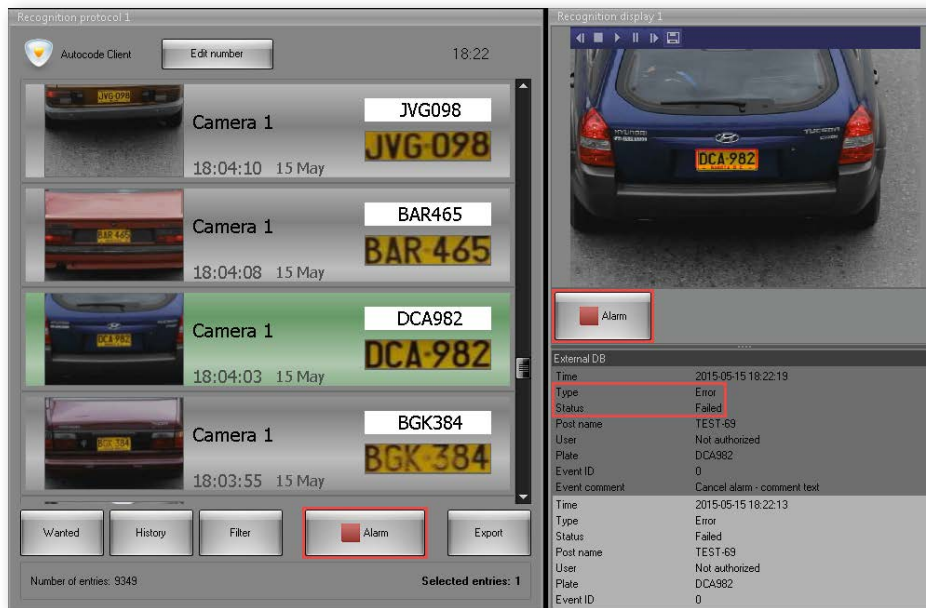
- **Comment field (1)** — a text field that may be used by operator to comment on the processed event.
- **Save button (2)** confirms cancelling the alarm with the comment inserted into comment field.
- **Cancel button (3)** closes the alarm cancelling form leaving the event with “New” status.

Figure 19 — Alarm cancelling form



A new alarm may be initiated for a failed event (Fig. 20).

**Figure 20 — Initiating a new alarm after it was cancelled**

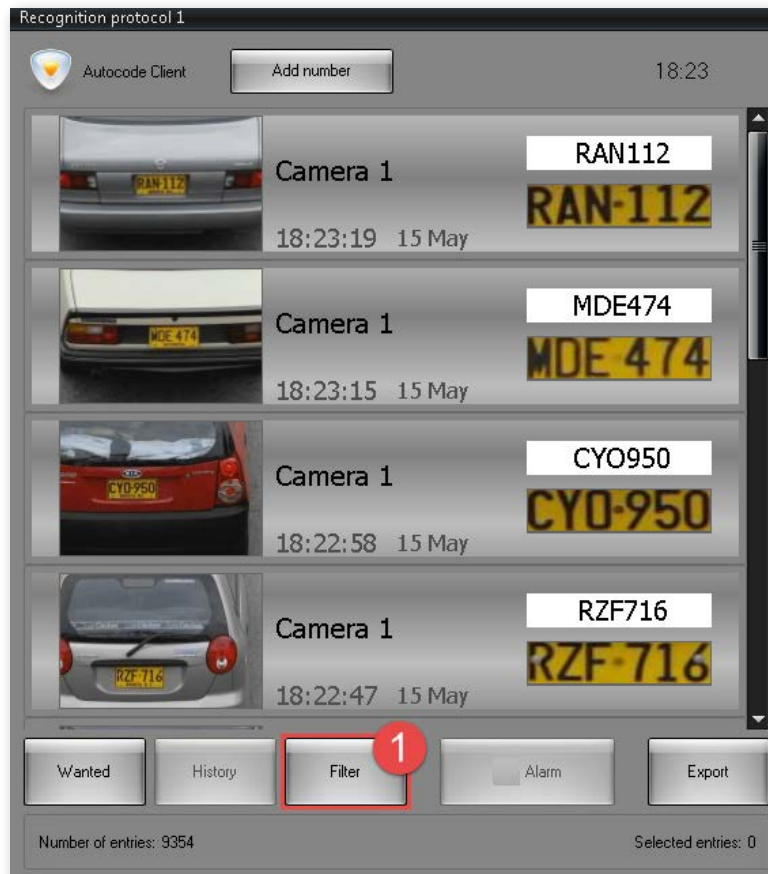


## 3.4. Filtering

To search for events:

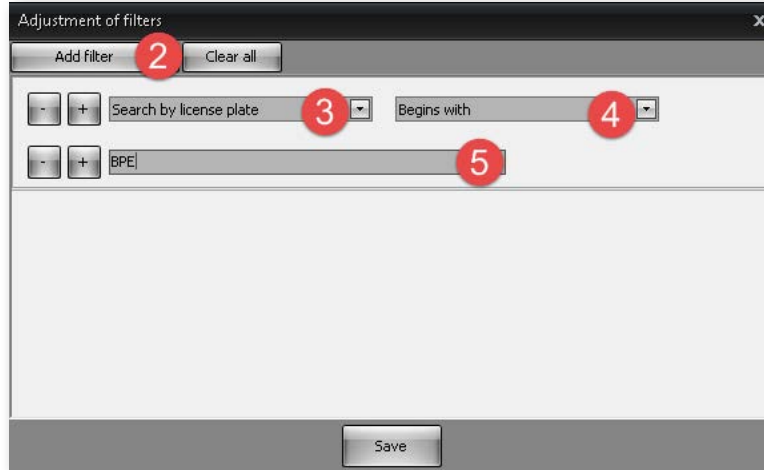
- click **Filter** in the recognition protocol (Fig 21,1).

**Figure 21 — Opening the Adjustment of filters window**



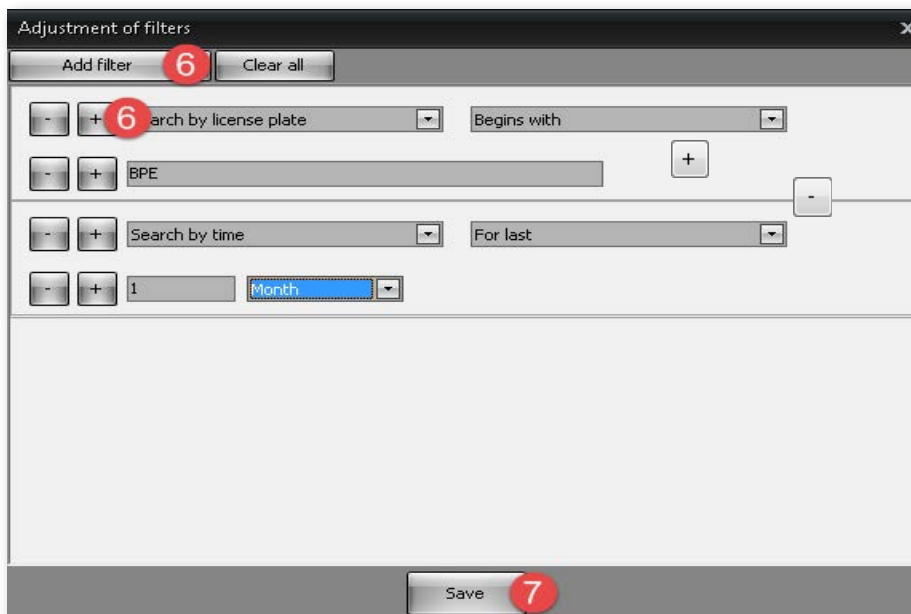
- click Add filter button in the **Adjustment of filters** window that appears (2).
- select the filter from the dropdown (3) (for example, By channel name).
- select the additional parameter is searching by **license plate or time** (4) (for example, “Matches”, “Last”, “Before”);
- set the filtration value (5) (Fig 22);

**Figure 22 — Filtering by one parameter**



- click **Add filter** button or  if the search needs to be made by multiple filters (click  to delete a filter) (6) (Fig. 23);

**Figure 23 — Filtering by multiple parameters**

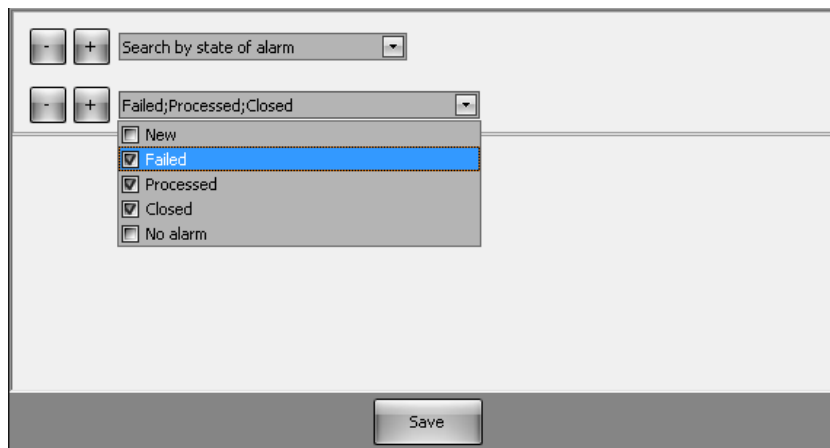


- click **Save** (7) to confirm filtering of events in recognition protocol.

If multiple filters are used, they are connected by logical AND.

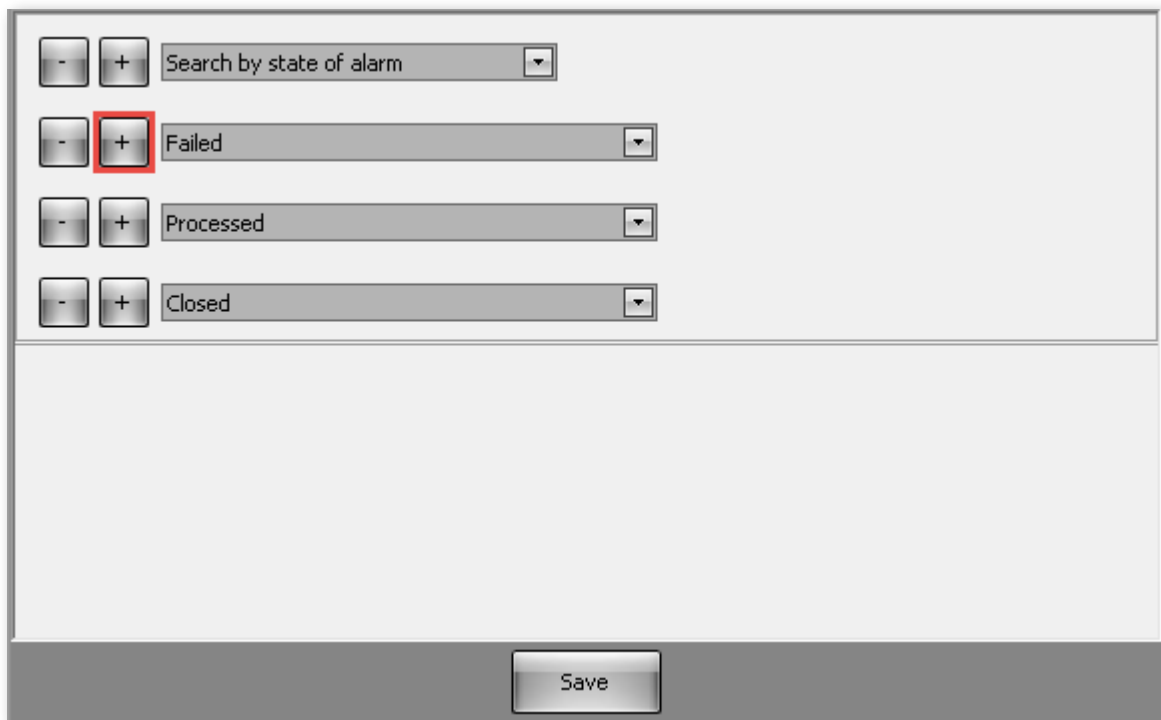
If filtering is done using parameter with dropdowns (By name of channel, By state of alarm, Direction) multiple values may be selected for one filter. In this case they are connected by logical OR meaning that the recognition protocol will display events that meet at least one of the filtering criteria (Fig. 24).

**Figure 24 — Selecting multiple values for a filter with dropdown (correct)**



It's not recommended to set the values separately in such cases (Fig. 25) since they will be connected by logical AND. This way no events will be displayed in recognition protocol.

**Figure 25 — Selecting multiple values for a filter with dropdown (incorrect)**



Click **Filter** to modify filtering criteria by opening the **Adjustment of filters** window. Click **Save** to confirm the changes.

To disable the filtering applied to the events in recognition protocol list, click **Clear all** in **Adjustment of filters** window.

Detailed description of filtering criteria can be found in [2.3. Filters](#) sub-section.





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