



# SYSMA

## *User Manual*

# Contents

<b>Introduction.....</b>	<b>3</b>
<b>Installation &amp; Registration.....</b>	<b>6</b>
<b>Menu .....</b>	<b>12</b>
<b>Toolbars .....</b>	<b>26</b>
<b>Setup.....</b>	<b>38</b>
<b>Keyboard Shortcuts.....</b>	<b>39</b>
<b>Projects .....</b>	<b>45</b>
<b>Channel Browser .....</b>	<b>91</b>
<b>CLX Editor .....</b>	<b>94</b>
<b>Connection Status .....</b>	<b>96</b>
<b>Log Window .....</b>	<b>97</b>
<b>View Windows.....</b>	<b>98</b>
<b>ECU.....</b>	<b>127</b>
<b>DataLogger.....</b>	<b>175</b>
<b>GPS MDU Environment .....</b>	<b>217</b>
<b>Dashboards .....</b>	<b>225</b>
<b>Dashboard Graphic Editor .....</b>	<b>247</b>
<b>Code Load .....</b>	<b>283</b>
<b>Virtual Channel.....</b>	<b>291</b>
<b>Tools .....</b>	<b>296</b>

# Introduction

SYSMA is an integrated software application designed for configuring and tuning the Electronic Control Units and all related systems of the vehicle, for the most advanced levels of the motorsport. SYSMA allows all the functionalities for the setup, measurement & calibration of the ECU, the Data Logger and the Dashboard.

The software is designed to be flexible and opened of the universal standard automotive platforms (ASAM), in order to ease of exchange data between electronic and software suppliers.

At the same time data formats and protocols dedicated for the Motorsport world and its needs of performances and reliabilities are implemented.

Support of an open architecture in order to permit integration with custom additional software tools. Public services are provided so that other applications can use SYSMA functions to fully control the system. The main functions of SYSMA can be summarized into the following categories:

## **Data Management**

Management of all the configurations files, measurement, calibrations, logging table and dashboard setup. Compare and merge of data versions, importing data between different firmware releases. Reprogram of the HW devices flashing the embedded firmware.

## **Data Analysis**

Several environments for data analysis and data management are provided within tool. A complete suite of graphical instruments allows you to monitor and tune the whole system. A large set of keyboard accelerators, user customizable, makes it easy and fast to be used. Display: full configurability of the screen layout according to the end-user preferences.

## **Minimum Computer Requirements**

### **Hardware**

- PC Pentium 4 Min Clock: 2 GHz
- Ethernet TCP/IP network interface 10/100/1000 MB
- RAM: 1GB
- 1 GB available on hard drive
- Compatible with dual & quad core processor.

### **Operating System**

Any of the following versions are supported: Windows 2000, Windows XP 32/64 bit, Windows Vista 32/64 bit, Windows 7 32/64 bit, Windows 8 32/64 bit.

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## **APPENDIX TO END USER LICENCE AGREEMENT**

**NUMBER OF INSTALLATIONS.** Number of workstations on which the Software may be installed on SYSMA, CLXInterface: a finite number of installations defined by User at order placement;

**IMPORTANT NOTE:** this covers only installations of MMM proprietary software. Any licence fees for third party software (e.g. Microsoft VBA "per seat" licences) are not included in the MMM licence fee.

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**SYSMA:** (i) supply of latest SYSMA software release at the time of new licence purchase or renewal; (ii) User is entitled to request, under payment, customization of SYSMA software; (iii) supply of upgraded features (at the sole discretion of MMM) and debugged SYSMA software releases, if any, during a valid licence period;

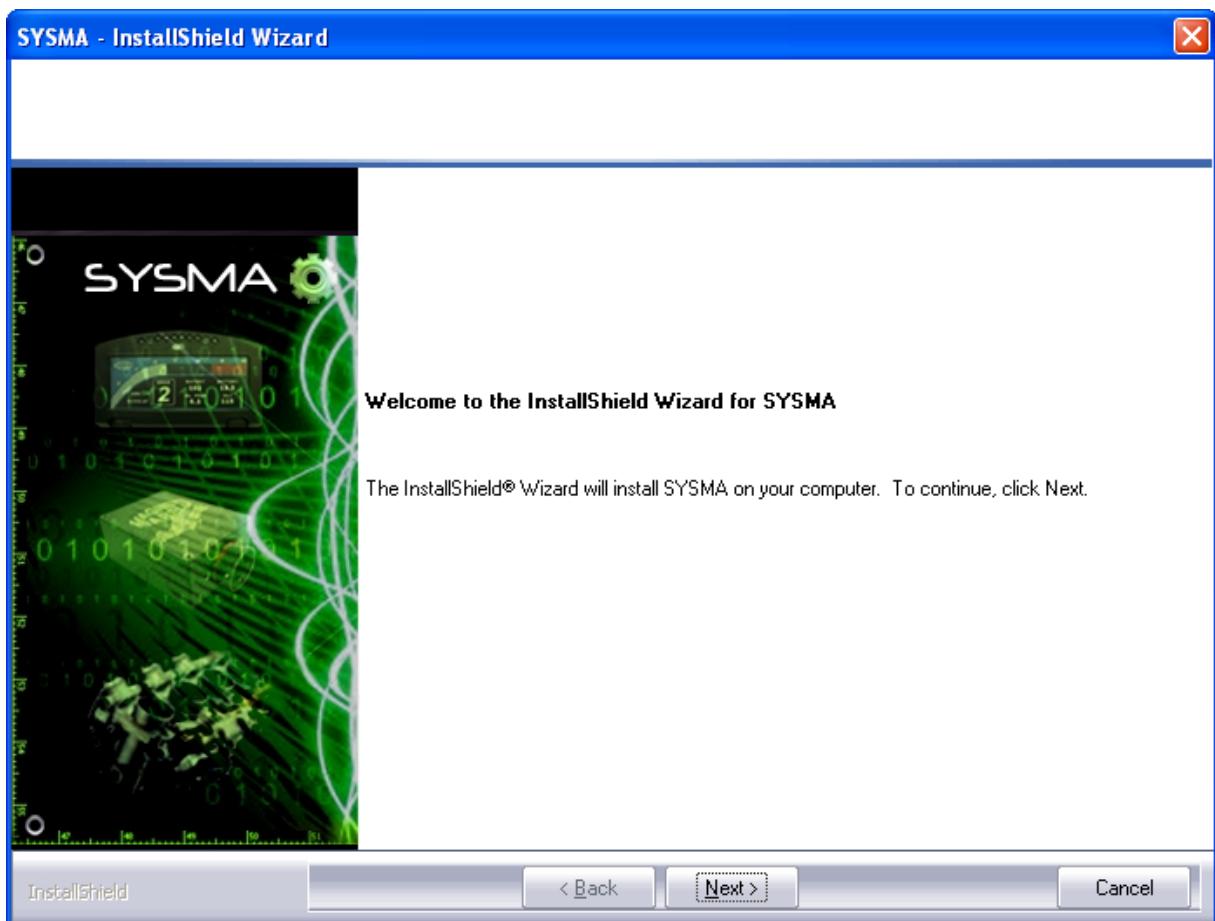
# Installation & Registration

## Before Installation: User Account

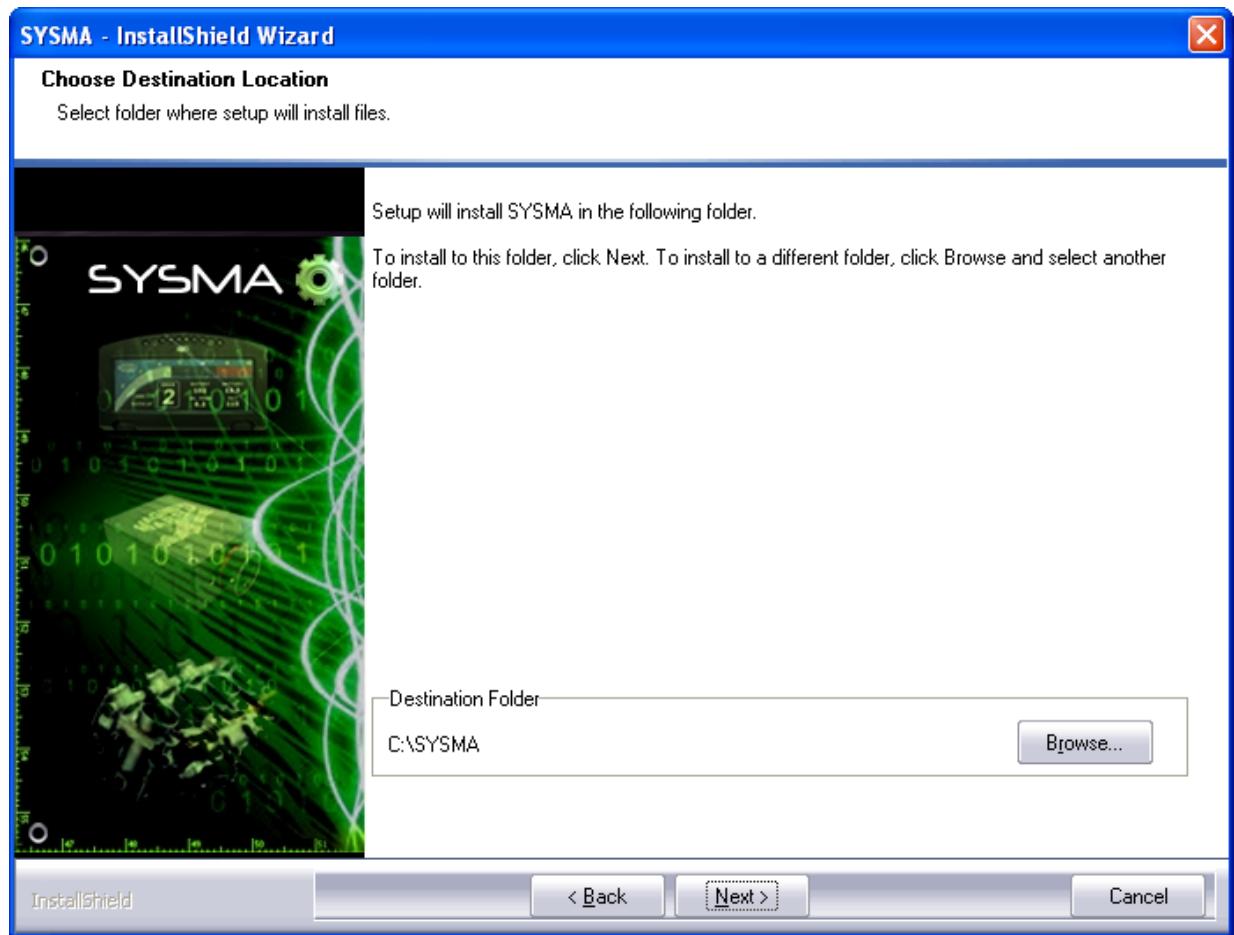
To install SYSMA you must have administrator rights. Make sure you have the correct permissions to perform the installation. If you have questions about this, ask your system administrator.

## Installation

1. Run setup.exe from the installer package then click on Next to continue the installation.



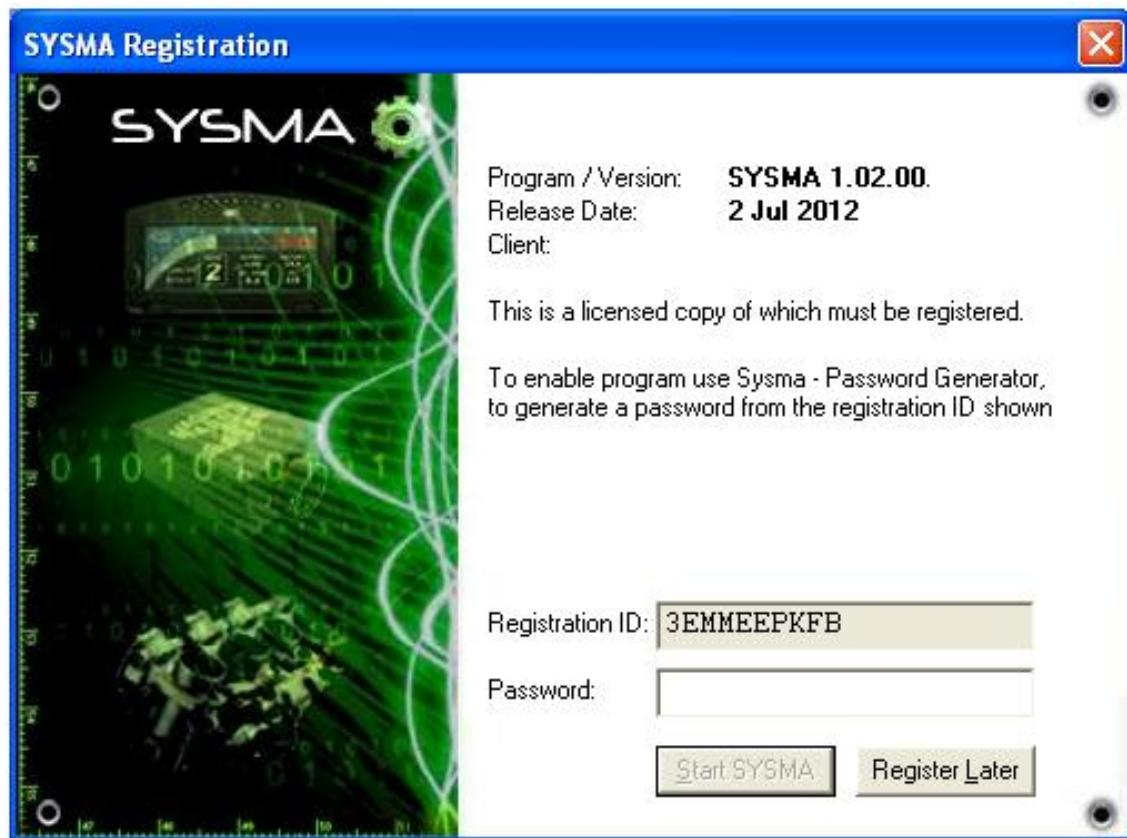
2. Choose the install path where to install the software. C:\SYSMA is the default path; change it selecting Browse button. Click Next to continue installation.



3. Click on Install to complete installation and Finish to exit the wizard.
4. Verify that a valid SYSMA License (SYSMA.lic) is present in the installation directory.
5. After completion, run SYSMA.

## Registration

1. Run SYSMA.
2. At first run, an authentication dialog will be presented with a Registration ID and prompting for a password

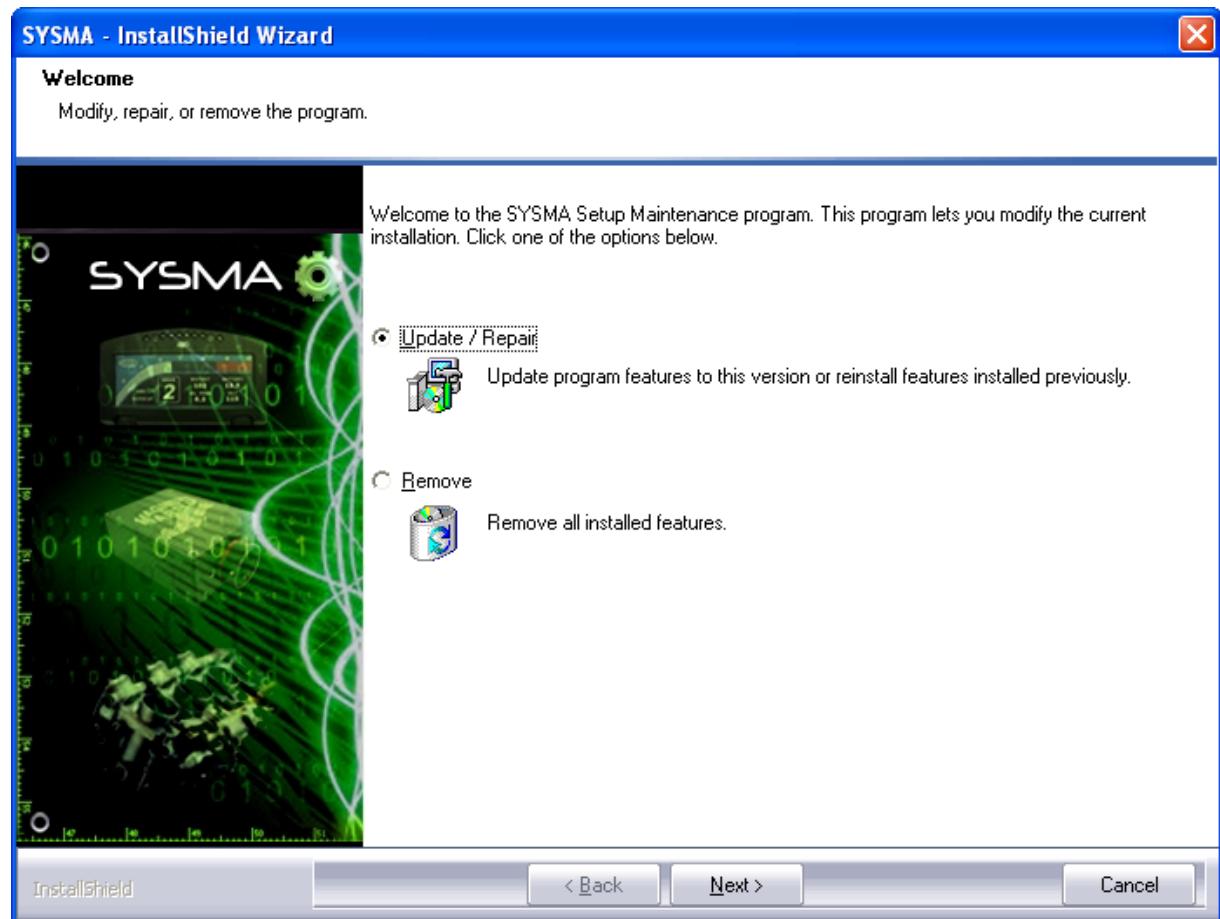


The password is generated from the Registration ID by **SYSMA Password Generator**, a separate tool, which is supplied with a protection dongle as part of the SYSMA licence. The protection dongle authorizes SYSMA Password Generator to issue a fixed number of passwords

3. Enter password and press Start SYSMA.
4. Upon restart, SYSMA will start without asking any password.

## Subsequent installation

1. Close SYSMA.
2. Run setup.exe from the installer package.
3. Installer package allows at users to Update/Repair the current installation or remove it. Select Update/Repair then continue.



4. If at the end of the installation a reboot of the PC is prompted, please carry it out otherwise some components will not be installed correctly.

# Importing Vision-Axon projects

Following steps briefly explain how to migrate a *Vision* or an *Axon* project into SYSMA.

## Migrating Vision project to SYSMA

1. Create a new SYSMA project (see Project Management - New).
2. Add a device of type ECU to the project, with *Add New Device/ECU* command in the popup menu that opens with right mouse button on the project item in the *Projects Workspace* window. (See Project - Project Workspace for details about *Projects Workspace* window).
3. Load a compliant ECU device description file (.DEV) in the project, with *Add File to Project/Device Description File (DEV)*... from popup menu that opens with right mouse button on the device item in the *Projects Workspace* window.
4. Import a Vision configuration file (.CFG or .CFZ) in the project, with main menu command *File/Import Data/Import CFG...* or *File/Import Data/Import CFZ...*. See Projects - Import - CFG and CFZ for details.
5. Import a Vision Channel List Library (.CLL) in the project, with main menu command *File/Import Data/Import CLL...*. See Projects - Import - CLL Channels List Library for details.
6. Load the imported file in the project, with command *Add File to Project/Database (CLX)*... from the popup menu that opens with right mouse button on ECU device in the *Projects Workspace* window. A list of Measurements is now available in the project.
7. Import a Vision map table files (.PTA) in the project, with main menu command *File/Import Data/Import PTA...*. See Projects - Import - PTA for details.
8. Load the imported file in the project, with command *Add File to Project/Database (CLX)*... from the popup menu that opens with right mouse button on ECU device in the *Projects Workspace* window. A list of Calibrations is now available in the project.
9. (Optionally) Import a firmware configuration file in the project, for programming the ECU device (see *Migrating ExeFiles project to SYSMA* later in this chapter).

## Migrating Axon project to SYSMA

1. Create a new SYSMA project (see Project Management - New).
2. Add a device of type DataLogger to the project, with *Add New Device/DataLogger* command in the popup menu that opens with right mouse button on the project item in the *Projects Workspace* window. (See Project - Project Workspace for details about *Projects Workspace* window).
3. Load a compliant DataLogger device description file (.DEV) in the project, *Add File to Project/Device Description File (DEV)*... from popup menu that opens with right mouse button on the device item in the *Projects Workspace* window.
4. Import an Axon table configuration file (.TPX) in the project, with *Add File to Project/Acquisition Table (TPX)*... command in the popup menu that opens with right mouse button on the DataLogger device item in the *Projects Workspace* window.
5. (Optionally) If the Axon configuration table imported also includes and supports a Dashboard, add a device of type Dashboard to the SYSMA project, with *Add New Device/Dashboard* command in the popup menu that opens with right mouse button on the project item in the *Projects Workspace* window. Also load a compliant Dashboard device description file (.DEV) in the project, *Add File to Project/Device Description File (DEV)*... from popup menu that opens with right mouse button on the device item in the *Projects Workspace* window.
6. (Optionally) If the Dashboard device is a graphical dashboard, also a Dashboard Layout configuration (.LYX) can be imported from Axon. Use command *Add File to*

*Project/Dashboard Layout (LYX)...* in the popup menu that opens with right mouse button on Dashboard item in the *Projects Workspace* window.

7. (Optionally) Import a firmware configuration file in the project, for programming the DataLogger and the Dashboard devices (see *Migrating ExeFiles project to SYSMA* later in this chapter).

## **Migrating ExeFiles project to SYSMA**

Every device can be provided with a specific firmware, which can be imported in SYSMA projects.

Use command *Add File to Project/Code Load Command List (CDL)...* from popup menu that opens with right mouse button on an item device in a project of the *Projects Workspace* window. (See *Project - Project Workspace* for details about *Projects Workspace* window).

The command automatically imports ALL the files required for the code loading.

# Menu

File Edit View ECU DataLogger Dashboard Code Load Options Tools Window Help

In the main window of SYSMA the following menus are available:

<b>File</b>	Commands to manage projects and layouts.
<b>Edit</b>	Standard commands for undo, redo, cut, copy, paste, move and sizing.
<b>View</b>	Commands to display the toolbars and the working windows.
<b>ECU</b>	Commands to manage ECU devices.
<b>DataLogger</b>	Commands to manage DataLogger devices.
<b>Dashboard</b>	Commands to manage Dashboards.
<b>Code Load</b>	Commands to manage Code Load operations.
<b>Tools</b>	Commands to access to working instruments of SYSMA
<b>Window</b>	Commands to display the windows.
<b>Help</b>	Commands to display the Info of SYSMA and to access this manual.

Many commands are also available with Keyboard Shortcuts.

## Menu File

COMMAND	ICON	SHORTCUT	DESCRIPTION
<b>Open Project...</b>		<b>Ctrl + O</b>	Opens an existing project files
<b>New Project...</b>		<b>Ctrl + N</b>	Creates a new project
<b>Save Project</b>			Saves current project to disk
<b>Save As Project ...</b>			Saves current project to disk with a different name
<b>Close Project</b>			Closes current project
<b>Project Setup...</b>			Opens interface to configure current project
<b>Merge Project...</b>			Opens interface for merging projects
<b>Layout Selection</b>			commands for managing layout
<b>First Layout</b>			Selects the first layout
<b>Previous Layout</b>			Selects the previous layout
<b>Next Layout</b>			Selects the next layout
<b>Last Layout</b>			Selects the last layout

<b>Load Layout</b>			Selects a specific layout
<b>Create Layout</b>			Creates a new layout
<b>Rename Layout...</b>			Renames current layout
<b>Delete Layout</b>			Deletes current layout
<b>Save Layout</b>			Saves current layout to disk
<b>Browse Database (CLX)...</b>			Browses for a Database file (.CLX)
<b>Save Database</b>			Saves current Database file to disk
<b>Save As Database...</b>			Saves current Database file to disk with a different name
<b>Save all Databases</b>			Saves to disk all Database files in the current project
<b>Database Set Management</b>			Switches between Database Sets
<b>Database Set Copy</b>			Copies current Database Set
<b><u>Import Data</u></b>			commands for managing import features
<b>Import A2L/MOT...</b>			Imports standard A2L Channels and Measurement definitions
<b>Import CLL...</b>			Imports Channel List Library files (.CLL)
<b>Import DBC...</b>			Imports CAN Channels Definition files (.DBC)
<b>Import PTA...</b>			Imports Map calibration files (.PTA)
<b>Import SYM...</b>			Imports Calibrations Definitions files (.SYM)
<b>Import CFG...</b>			Imports old configuration files (.CFG)
<b>Import CFZ...</b>			Imports old configuration files (.CFZ)
<b>Add File To Project...</b>			Adds a specific file to current project
<b>Print Setup...</b>			Configures print settings
<b>Print Window...</b>		<b>Ctrl + Shift + P</b>	Prints current window

<b>Projects History List</b>			Shows the list of most recently used files (MRU)
<b>Exit</b>			Quits applications

## Menu Edit

COMMAND	ICON	SHORTCUT	DESCRIPTION
<b>Cut</b>		<b>Ctrl + X</b>	standard Windows cut operation (context depending operation)
<b>Copy</b>		<b>Ctrl + C</b>	standard Windows copy operation (context depending operation)
<b>Paste</b>		<b>Ctrl + V</b>	standard Windows paste operation (context depending operation)
<b>Undo</b>		<b>Ctrl + Z</b>	Undo last operation executed
<b>Redo</b>		<b>Ctrl + Y</b>	Redo last operation executed
<b>Delete Table...</b>			Deletes current table
<b>Remove From Group</b>			Remove selected item from Group
<b>Move Up Table Item</b>			Moves current table item up in the list
<b>Move Down Table Item</b>			Moves current table item down in the list
<b>Lock</b>			Protects channels in current table
<b>Unlock</b>			Removes protection for channels in current table
<b><u>Size And Position</u></b>			commands for managing item size and position
<b>Align Top</b>			Aligns selected items to Top
<b>Align Bottom</b>			Aligns selected items to Bottom
<b>Align Left</b>			Aligns selected items to Left
<b>Align Right</b>			Aligns selected items to Right
<b>Space Across</b>			Spaces selected items horizontally

<b>Space Down</b>			Spaces selected items vertically
<b>Align Divider</b>			Aligns dividers for selected items
<b>Make Same Width</b>			Makes selected items the same width
<b>Make Same Height</b>			Makes selected items the same height
<b>Make Same Size</b>			Makes selected items the same width and height
<b>Make Same Style</b>			Makes the same style for selected Channels
<b><u>Default Instrument Type</u></b>			commands for selecting default Instrument Type
<b>Alphanumeric</b>			Selects Alphanumeric Instrument as default
<b>Alphanumeric Alarm</b>			Selects Alphanumeric Alarm Instrument as default
<b>Bar Graph</b>			Selects Bar Graph Instrument as default
<b>Gauge</b>			Selects Gauge Instrument as default
<b>Potentiometer</b>			Selects Potentiometer Instrument as default
<b>Selector</b>			Selects Selector Instrument as default
<b>Bitmap</b>			Selects Bitmap Instrument as default
<b>Remove Channel</b>		<b>Ctrl + Delete</b>	Removes selected channel from current window
<b>Window Properties</b>			Configure current window
<b>Channel Properties</b>			Configure current channel

## **Menu View**

COMMAND	ICON	SHORTCUT	DESCRIPTION
<b>Channel Browser</b>		<b>Ctrl + F2</b>	Opens or closes Channel Browser window
<b>Projects Workspace</b>		<b>Ctrl + F5</b>	Opens or closes Project Workspace window
<b>Connection Status</b>		<b>Ctrl + F6</b>	Opens or closes Connection Status window

<b>Instrument Window</b>			Creates a new Instrument window
<b>Oscilloscope Window</b>			Opens Oscilloscope window
<b>Read Write Window</b>		<b>Ctrl + R</b>	Opens or closes Read Write window
<b>Alarms Report Window</b>			Creates a new Alarms Report window
<b>Diagnostic Report Window</b>			Creates a new Diagnostic Report window
<b>Data Logger Channels Windows</b>			Opens or closes Data Logger Channels window
<b>ECU Channels Window</b>			Opens or closes ECU Channels window
<b><u>Toolbar</u></b>			commands for managing toolbars
<b>Projects</b>			Shows or hides Projects toolbar
<b>ECU</b>			Shows or hides ECU toolbar
<b>Code Load</b>			Shows or hides Code Load toolbar
<b>Data Logger</b>			Shows or hides Data Logger toolbar
<b>Dashboard Editor</b>			Shows or hides Dashboard Editor toolbar
<b>Instruments Editor</b>			Shows or hides Instruments Editor toolbar
<b>Size And Position</b>			Shows or hides Size And Position toolbar
<b>ECU Hotkeys</b>			Shows or hides ECU Hotkeys toolbar
<b>Customize...</b>			Configures custom toolbars
<b>Status Bar</b>			Shows or hides Status Bar
<b>Layouts Bar</b>			Shows or hides Layout Bar
<b>Configure Layouts Bar...</b>			Configures Layouts Bar
<b>Show/Hide Track</b>			Shows or hides Track
<b>Log Window</b>		<b>Ctrl + L</b>	Opens or closes Log window
<b>Sort</b>			Sorts items in a list (context depending operation)

## Menu ECU

COMMAND	ICON	SHORTCUT	DESCRIPTION
<u>ECU Info</u>			commands for managing ECU information
Box-Unit			Opens Box-Unit window
Static Table...			Opens Static Table window
Dynamic Table...			Opens Dynamic Table window
Dynamometric Bench			Opens Dynamometric Bench window
Info Release...			Opens Info Release window
Status box Window		<b>Ctrl + K</b>	Opens Status box window
String List		<b>Ctrl + I</b>	Opens String List window
Upload From ECU			Uploads calibrations values from ECU
<u>Calibration</u>			commands for managing calibrations
2D Graph Mode		<b>Ctrl + G</b>	Opens or closes 2D Graph window for current Calibration window
3D Graph Mode		<b>Ctrl + H</b>	Opens or closes 3D Graph window for current Calibration window
Graph Row/Col...		<b>Alt + /</b>	Switches Row/Column visualization for current 2D Graph window
Read table		<b>F6</b>	Reads current calibrations from ECU
Write table		<b>F7</b>	Writes current calibrations from ECU
Open in Excel			Exports values for current Calibration window in Excel and opens Excel application
CSV Import			Imports values form a CSV file to current Calibration window
CSV Export			Exports values from current Calibration window to a CSV file
Edit BPX			Edits BPX values in current Calibration window
Edit BPY			Edits BPY values in current Calibration window

<b>Insert Row</b>			Inserts a row in current Calibration window
<b>Insert Col</b>			Inserts a column in current Calibration window
<b>Delete Row</b>			Deletes current row in current Calibration window
<b>Delete Col</b>			Deletes current column in current Calibration window
<b>Restore old values ...</b>		<b>Ctrl + Z</b>	Restores old values in current Calibration window
<b>Control Step Editor</b>		<b>Ctrl + S</b>	Opens a window for Control Step editing
<b>Show header</b>		<b>F10</b>	Shows or hides header area in current Calibration window
<b>Show value difference</b>		<b>F8</b>	Shows or hides value difference in current Calibration window
<b>Show comment</b>		<b>F9</b>	Shows or hides calibration comment in current Calibration window
<b>Start/Stop Mapping</b>			Starts or Stops Mapping
<b>Open Mapping...</b>			Searches for the calibration channel
<b>Upload/Download Calibration Data</b>			Uploads or Downloads calibrations data to or from ECU
<b><u>Protected Tables</u></b>			commands for managing protection of calibrations
<b>Encrypt Protected Tables</b>			Encrypts protected calibration tables on ECU
<b>Decrypt Protected Tables</b>			Decrypts protected calibration tables on ECU
<b>Erase Encrypted Tables</b>			Reset protection for calibration tables on ECU
<b><u>Diagnostic Windows</u></b>			commands for managing Diagnostic windows
<b>Print Diagnostic Report</b>			Prints report for current Diagnostic window
<b>Clear Diagnostic History</b>			Clears History content on current Diagnostic window
<b><u>Alarm Windows</u></b>			commands for managing Alarm windows
<b>Print Channel</b>			Prints report for current Channel Alarm

<b>Alarms Report</b>			window
<b>Clear Channel Alarms History</b>			Clears History content on current Channel Alarm window
<b><u>Oscilloscope Windows</u></b>			commands for managing Oscilloscope window
<b>Start/Stop Oscilloscope Logging</b>			Starts or Stops logging data on Oscilloscope window
<b>Save Data To ZTX...</b>			Saves data from Oscilloscope window to ZTX file
<b>Potentiometer TX On/Off</b>		<b>Ctrl + T</b>	Switches On/Off transmission of Potentiometer values to ECU
<b>Potentiometer Values</b>			commands for managing potentiometer instruments
<b>Load Potentiometers Values...</b>			Loads Potentiometer values from file (.VPT format)
<b>Save As Potentiometers Values...</b>			Saves Potentiometer values to file (.VPT format)
<b><u>Data Recorder</u></b>			commands for managing Data Recorder
<b>On/Off Data Recorder</b>			Starts or Stops Data Recorder function
<b>Save data to file...</b>		<b>Ctrl + Space</b>	Saves to file data logged with Data Recorder function
<b>Continuous</b>		<b>Ctrl + Q</b>	Switches Data Recorder logging mode (Continuous or not)
<b>Setup Data Recorder...</b>			Configures Data Recorder settings
<b>Print Data Recorder Log...</b>			Prints data logged with Data Recorder function
<b>Load data from file...</b>			Loads from file a set of data logged with Data Recorder
<b>Replay Stop</b>			Stops simulation of ECU session using data file of Data Recorder values
<b>Replay Single Step</b>		<b>Ctrl + Shift + Space</b>	Simulates ECU session using data file of Data Recorder values step by step
<b>Replay Continuous</b>		<b>Ctrl + Shift + W</b>	Simulates ECU session using data file of Data Recorder values in Continuous mode
<b>Desk Potentiometer Start</b>		<b>Ctrl + P</b>	Starts Desk Potentiometer function

<b>ASAP3 Protocol Start</b>		<b>Ctrl + A</b>	Starts ASAP3 Protocol
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## **Menu Data Logger**

COMMAND	ICON	SHORTCUT	DESCRIPTION
<b>DataLogger Info Release...</b>			Shows DataLogger Info Release window
<b>Transmit DataLogger Table...</b>			Transmits current DataLogger Table to device
<b>Restart DataLogger</b>			Restarts acquisition process on DataLogger device
<b><u>Receive DataLogger Table</u></b>			
<b>Load</b>			
<b>Save</b>			
<b><u>Clear DataLogger</u></b>			
<b>Clear Data...</b>			Clears data stored on DataLogger device
<b>Clear Data and Table...</b>			Clears data and Table stored on DataLogger device
<b>Format DataLogger...</b>			Clears all memory areas on DataLogger device
<b>Date &amp; Time Setup...</b>			Configures Date and Time on DataLogger device
<b>Set Track Run...</b>			Sets the value for Run and sends it to the logger
<b><u>Set Trigger</u></b>			commands for managing trigger
<b>Trigger On</b>			Switches ON Trigger management on DataLogger device
<b>Trigger Off</b>			Switches OFF Trigger management on DataLogger device
<b>Set Zeros</b>			Sets channels configured as Zeros to their target values
<b>Activate Channel View</b>			Starts displaying in Channel View window logged values for channels configured on Data Logger device
<b>Open Channels View Custom Filter...</b>			Configures a subset of selected channels in the Channel View window
<b><u>Acquisition Table Editing</u></b>			commands for managing Table Editing

<b>Zeros</b>			commands for managing Zeros
<b>Zero...</b>			Configures Zero channels in the table
<b>Clear Offset...</b>			Clears Logger Offset for channels configured as Zero
<b>Sensor</b>			Configures Sensor channels in the table
<b><u>Insert Trigger</u></b>			commands for managing Trigger conditions
<b>Acquisition...</b>			Configures or adds an Acquisition Trigger condition on current table
<b>A-&gt;B...</b>			Configures or adds an High Frequency Trigger condition on current table
<b><u>Compression Alphabet</u></b>			commands for managing Compression Alphabets
<b>Import alphabet compression</b>			Imports a dictionary file for data compression from disk
<b>Export alphabet compression</b>			Export a dictionary file for data compression and save it to disk
<b>Group Setup...</b>			Configures DataLogger Group settings
<b>Table Properties...</b>			Configures Table Properties
<b>Select Logger Type...</b>			Selects a logger from the list of connected devices
<b><u>Dashboard</u></b>			commands for managing current dashboard
<b>Select Dashboard...</b>			Selects a Dashboard device
<b>Alarm...</b>			Configures alarm conditions on dashboard device
<b>Load Layout...</b>			Loads from disk a layout configuration for dashboard device
<b>Dashboard Properties...</b>			Configures properties for dashboard device
<b>New Table...</b>			Creates a new Table
<b>Load Table...</b>			Loads a Table file from disk
<b>Save Table</b>			Save current Table to disk
<b>Save DataLogger Table As...</b>			Save current Table to disk with a different name

<b>Logging Table Information</b>			Shows Logging Table Information window
<b>DataLogger Options...</b>			Configures DataLogger Options

## **Menu Dashboard**

COMMAND	ICON	SHORTCUT	DESCRIPTION
<b>Load Dashboard...</b>			Loads a Dashboard configuration Table from disk
<b>New Dashboard...</b>		<b>Ctrl + D</b>	Creates a new Dashboard configuration Table
<b>Save Dashboard</b>			Saves current Dashboard Table to disk
<b>Save Dashboard As...</b>			Saves current Dashboard Table to disk with a different name
<b>Transmit Dashboard Configuration</b>			Transmits current Dashboard Table to Dashboard device
<b>New Page</b>			Creates a new Page on current Dashboard Table
<b>Delete Page</b>			Deletes selected Page on current Dashboard Table
<b>Table</b>			commands for managing tables
<b>Change Table ...</b>			Changes the Acquisition Table file relative to this project
<b>Remove Table File</b>			Removes the Acquisition Table file relative to this project
<b>Reload Table File</b>			Reloads current Acquisition Table file and updates the project
<b>Add</b>			
<b>Channel Name</b>			Creates a new Channel Name item
<b>Channel Value</b>			Creates a new Channel Value item
<b>String Const</b>			Creates a new String Constant item
<b>RX Msg</b>			Creates a new RX Message item
<b>Alarm Channel Msg</b>			Creates a new Alarm Channel Message item
<b>Alarm Channel</b>			Creates a new Alarm Channel Value item

<b>Value</b>			
<b>Alarm Channel Label</b>			Creates a new Alarm Channel Label item
<b>Icon</b>			Creates a new Icon item
<b>Icon Alarm</b>			Creates a new Icon Alarm item
<b>Icon Multiframe</b>			Creates a new Icon Multiframe item
<b>Icon Diagnostic</b>			Creates a new Icon Diagnostic item
<b>New Instrument</b>			Creates a new Instrument Model
<b><u>Grouping</u></b>			commands for managing groups
<b>Group Objects</b>			Groups selected objects
<b>Ungroup Objects</b>			Ungroups selected objects
<b><u>User Object</u></b>			commands for managing User Objects
<b>Create User Object</b>			Creates User Object from selected items
<b>Insert User Object</b>			Inserts a new User Object
<b>Grid Settings</b>			Configures Grid settings for Dashboard Table
<b>Set As Default</b>			Sets as default setting for the next text objects
<b>Find In Tree</b>			Finds current item or page in the workspace toolbar

## **Menu Code Load**

COMMAND	ICON	DESCRIPTION
<b><u>Archive</u></b>		commands for managing Code Load Command List archives
<b>New Command List...</b>		Creates a new Code Load Command List file (CDL)

<b>Load Configuration...</b>		Loads a Code Load Command List file from disk
<b>Save Command List</b>		Save current Code Load Command List to disk
<b>Save As Command List...</b>		Save current Code Load Command List to disk with a new name
<b>Execute Code Loading</b>		Executes current Code Load Command List file (CDL)
<b><u>Single Command</u></b>		commands for managing single commands from Code Load Command List files
<b>Select Command...</b>		Executes a selected command from current Code Load Command List file
<b>Last Command...</b>		Executes the last command from current Code Load Command List file
<b>Code Load Options...</b>		Configures Code Load Options

## **Menu Tools**

COMMAND	ICON	SHORTCUT	DESCRIPTION
<b>Virtual Channel</b>			Configures Virtual Channels
<b><u>Run</u></b>			commands for managing external applications
<b>Generic Application...</b>			Runs generic external application
<b>Excel</b>		<b>Ctrl + E</b>	Runs Excel
<b>Compare CLX...</b>			Compares Database CLX files
<b>Compare TPX...</b>			Compares logger Table TPX files
<b>Check CLX - TPX...</b>			Checks coherency between Database CLX or logger Table TPX files
<b>Customize Accelerators</b>			Configures accelerators short keys for commands
<b>General Options</b>			Configures General Options settings

## Menu Window

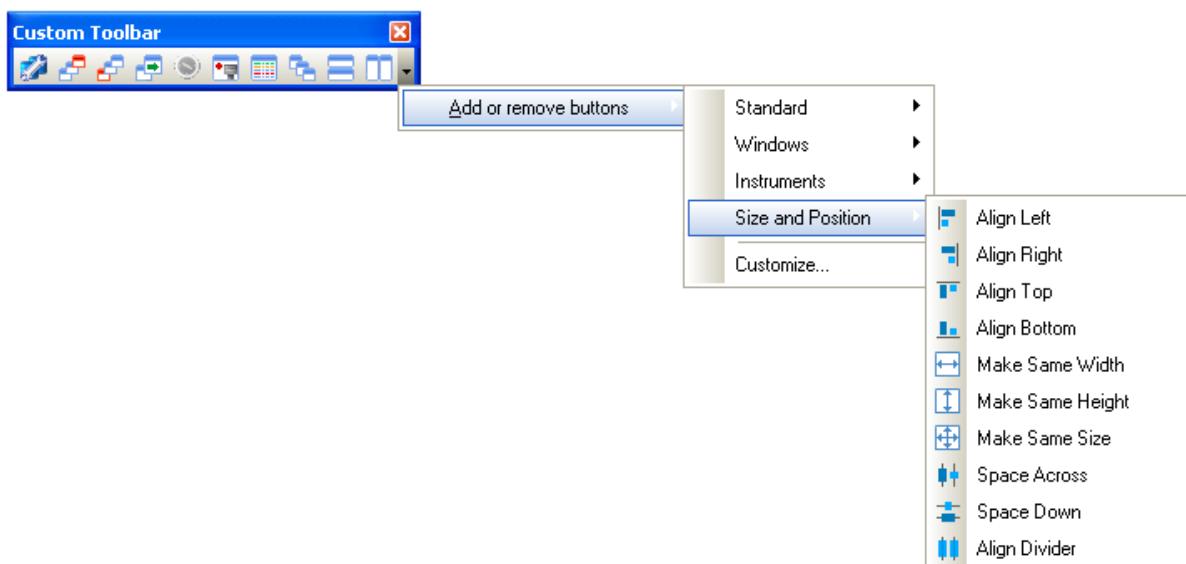
COMMAND	ICON	SHORTCUT	DESCRIPTION
Cascade			Arranges the windows in cascade.
Tile Horizontally			Reduces all windows so to horizontally optimize the space.
Tile Vertically			Reduces all windows so to vertically optimize the space.
Fit Current			Reduces the active window so that it does not overlap to other windows.
Close All			Closes all windows open in the workspace.
Hide Captions			Hides the title bar of all windows.
Window...		Ctrl + Q	Opens window for managing the list of analysis windows available in current layout.

## Menu Help

COMMAND	ICON	SHORTCUT	DESCRIPTION
Help		F1	Link to User Guide
About SYSMA...			Opens the about window of SYSMA
Current Language...			<p>It opens an interface for selecting a different Language</p> 

# Toolbars

SYSMA has some default toolbars that are displayed or that can be displayed when the program is launched for the first time. All the default toolbars cannot be modified. It is anyhow possible to create new toolbars that can be modified at will. To view the toolbars, use the main menu View/Toolbar and select or deselect the requested toolbars. Clicking with the right button on the toolbars area can carry out the same operation. Each toolbar can be kept floating or docked to the main window; some toolbar can be docked on each of the four sides of the window, some others can be docked only up and down or left and right. To dock a toolbar, drag it on the area of the window to be blocked to or double click on the bar of the title. In this latter case the toolbar will be placed on the last area where it had been docked. Vice versa to make a docked toolbar floating, double click on the external border of the toolbar or drag it with the mouse outside the dock area. The configurable toolbars have a downward arrow on their right. This arrow corresponds to a button that opens a menu through which some predefined commands can be added or removed from the toolbar.



Some commands are grouped on the basis of their use or of the frequency of use and they can be found in the default groups. Using the Configure menu (that is equal to the command of the View/Toolbar/Customize main menu) the configuration window of the toolbars can be opened, through this window all commands on SYSMA can be added or removed. The default toolbars available in SYSMA are:

- **Projects**
- **ECU**
- **Code Load**
- **Data Logger**
- **Dashboard Editor**
- **Instruments Editor**
- **Size and Position**
- **ECU Hotkeys**

## Projects

This toolbar is predefined and cannot be configured. It offers a quick access to the projects commands in SYSMA. The display of the toolbar can be enabled/disabled through the View/Toolbars/Projects command of the main menu or by clicking with the right button on the area of the toolbars



COMMAND	ICON	SHORTCUT	DESCRIPTION
New Project...		Ctrl + N	Create a new Project
Open Project...		Ctrl + O	Open a Project file
Close Project			Closes current project
Save Project			Saves current project to disk
New Layout			Creates a new layout
Save Layout			Saves current layout to disk
Previous Layout			Selects the previous layout
Next Layout			Selects the next layout
Alarms Report Window			Creates a new Alarms Report window
Diagnostic Report Window			Creates a new Diagnostic Report window
Instrument Window			Creates a new Instrument window
Oscilloscope Window			Opens Oscilloscope window
Read Write Window		Ctrl + R	Opens or closes Read Write window
Data Logger Channels Window			Opens or closes Data Logger Channels window
Projects Workspace			Opens or closes Project Workspace window
Channel Browser		Ctrl + F2	Opens or closes Channel Browser window
Connection Status			Opens or closes Connection Status window

<b>Log Window</b>		<b>Ctrl + L</b>	Opens or closes Log window
<b>Database Set Management...</b>			Switches between Database Sets
<b>Save all Databases</b>			Saves to disk all Database files in the current project
<b>Project Setup</b>			Opens interface to configure current project

For a description of each command, please read the corresponding menu File and menu View

## ECU

This toolbar is predefined and cannot be configured. It offers a quick access to the projects commands in SYSMA. The display of the toolbar can be enabled/disabled through the View/Toolbars/Projects command of the main menu or by clicking with the right button on the area of the toolbars



COMMAND	ICON	SHORTCUT	DESCRIPTION
<b>Encrypt Protected Table</b>			Encrypts protected calibration tables on ECU
<b>Decrypt Protected Table</b>			Decrypts protected calibration tables on ECU
<b>Desk Potentiometer Start</b>		<b>Ctrl + P</b>	Starts Desk Potentiometer function
<b>Transmit Potentiometer Desk Values</b>		<b>Ctrl + T</b>	Switches On/Off transmission of Potentiometer values to ECU
<b>ASAP3 Protocol Start</b>		<b>Ctrl + A</b>	Starts ASAP3 Protocol
<b>Start/Stop Mapping</b>			Starts or Stops Mapping
<b>Restore Old Values</b>			
<b>Start/Stop oscilloscope data logging</b>			Starts or Stops logging data on Oscilloscope window
<b>2D Graph Mode</b>		<b>Ctrl + G</b>	Opens or closes 2D Graph window for current Calibration window
<b>3D Graph Mode</b>		<b>Ctrl + H</b>	Opens or closes 3D Graph window for current Calibration window

## **CodeLoad**

This toolbar is predefined and cannot be configured. It offers a quick access to the projects commands in SYSMA. The display of the toolbar can be enabled/disabled through the View/Toolbars/Projects command of the main menu or by clicking with the right button on the area of the toolbars



COMMAND	ICON	SHORTCUT	DESCRIPTION
Create new file batch (CDL)			Creates a new Code Load Command List file (CDL)
Open an existing file			Loads a Code Load Command List file from disk
Save file batch			Save current Code Load Command List to disk
Code Load Options...			Configures Code Load Options
Execute Code Loading			Executes current Code Load Command List file (CDL)

## **Data Logger**

This toolbar is predefined and cannot be configured. It offers a quick access to the projects commands in SYSMA. The display of the toolbar can be enabled/disabled through the View/Toolbars/Projects command of the main menu or by clicking with the right button on the area of the toolbars



COMMAND	ICON	SHORTCUT	DESCRIPTION
New Table			Creates a new Data Logger Table configuration
Load Table			Loads an existing Data Logger Table configuration file from disk
Save Table			Save current Table to disk
Save As			Save current Table to disk with a different name

<b>Channel Properties</b>			Configures properties for channels selected in current Table window
<b>Logger Table Properties</b>			Configures properties for current Logger Table window
<b>DataLogger Information</b>			Shows DataLogger Info Release window
<b>Transmit DataLogger Table...</b>			Transmits current DataLogger Table to device
<b>Restart DataLogger</b>			Restarts acquisition process on DataLogger device
<b>Trigger On</b>			Switches ON Trigger management on DataLogger device
<b>Trigger Off</b>			Switches OFF Trigger management on DataLogger device
<b>Activate Channel View</b>			Shows Channel View window
<b>Set Zeros</b>			Sets channels configured as Zeros to their target values
<b>Clear Log Offset</b>			Clears target values calculated with Set Zeros command
<b>Insert Zero</b>			Adds new Zero channel to current Table
<b>Options...</b>			Configures DataLogger Options

## **Dashboard Editor**

This toolbar is predefined and cannot be configured. It offers a quick access to the projects commands in SYSMA. The display of the toolbar can be enabled/disabled through the View/Toolbars/Projects command of the main menu or by clicking with the right button on the area of the toolbars



COMMAND	ICON	SHORTCUT	DESCRIPTION
<b>New Dashboard...</b>			Creates a new Dashboard configuration Table
<b>Load Dashboard</b>		<b>Ctrl + D</b>	Loads a Dashboard configuration Table from disk
<b>Save the current dashboard</b>			Saves current Dashboard Table to disk

<b>Save the current dashboard as...</b>			Saves current Dashboard Table to disk with a different name
<b>New Page</b>			Creates a new Page on current Dashboard Table
<b>Delete Page</b>			Deletes selected Page on current Dashboard Table
<b>Channel Name</b>			Creates a new Channel Name item
<b>Channel Value</b>			Creates a new Channel Value item
<b>String Const</b>			Creates a new String Constant item
<b>New Rx Msg</b>			Creates a new RX Message item
<b>Rx Msg</b>			
<b>Alarm Channel Msg</b>			Creates a new Alarm Channel Message item
<b>Alarm Channel Value</b>			Creates a new Alarm Channel Value item
<b>Alarm Channel Label</b>			Creates a new Alarm Channel Label item
<b>Icon</b>			Creates a new Icon item
<b>Icon Alarm</b>			Creates a new Icon Alarm item
<b>Icon Multiframe</b>			Creates a new Icon Multiframe item
<b>Icon Diagnostic</b>			Creates a new Icon Diagnostic item
<b>New Instruments</b>			Creates a new Instrument Model
<b>Insert User Object</b>			Inserts a new User Object
<b>Show / Hide Project Bar</b>			
<b>Show / Hide Item Bar</b>			
<b>Grid Settings</b>			Configures Grid settings for Dashboard Table
<b>Zoom Level Editor</b>			Configures Zoom Level settings
<b>Increase Zoom Level</b>			Increases current Zoom Level
<b>Decrease Zoom Level</b>			Decreases current Zoom Level
<b>Transmit Dashboard Configuration</b>			Transmits current Dashboard Table to Dashboard device

## Instruments Editor

This toolbar is predefined and cannot be configured. It offers a quick access to the projects commands in SYSMA. The display of the toolbar can be enabled/disabled through the View/Toolbars/Projects command of the main menu or by clicking with the right button on the area of the toolbars



COMMAND	ICON	SHORTCUT	DESCRIPTION
Remove Channel		Ctrl + Del	Removes selected channel from current window
Channel Properties			Configures selected item in current window
Window Properties			Configures current window properties
Alphanumeric Channel			Selects Alphanumeric Instrument as default
Alphanumeric Alarm Channel			Selects Alphanumeric Alarm Instrument as default
Bar Graph Channel			Selects Bar Graph Instrument as default
Gauge Channel			Selects Gauge Instrument as default
Potentiometer Channel			Selects Potentiometer Instrument as default
Selector Channel			Selects Selector Instrument as default
Bitmap channel			Selects Bitmap Instrument as default
Make Same Style			Sets the same style for selected items

## Size and Position

This toolbar is predefined and cannot be configured. It offers a quick access to the projects commands in SYSMA. The display of the toolbar can be enabled/disabled through the View/Toolbars/Projects command of the main menu or by clicking with the right button on the area of the toolbars



COMMAND	ICON	SHORTCUT	DESCRIPTION
Align Top			Aligns selected items to Top
Align Bottom			Aligns selected items to Bottom
Align Left			Aligns selected items to Left
Align Right			Aligns selected items to Right
Space Across			Spaces selected items horizontally
Space Down			Spaces selected items vertically
Align Divider			Aligns dividers for selected items
Make Same Width			Makes selected items the same width
Make Same Height			Makes selected items the same height
Make Same Size			Makes selected items the same width and height

## ECU Hotkeys

This toolbar is predefined and cannot be configured. It offers a quick access to the projects commands in SYSMA. The display of the toolbar can be enabled/disabled through the View/Toolbars/ECU Hotkeys command of the main menu or by clicking with the right button on the area of the toolbars. The content of the toolbar and the meaning of each item associated to commands in SYSMA depend upon the current active window.

## Instrument



COMMAND	ICON	SHORTCUT	DESCRIPTION
Step		F2	Configures the step value to use for selected channel
Map		F3	Enables Mapping function
Write all continuous		F4	Enables Write continuous mode for all Potentiometer instruments in the window
Write continuous		F5	Enables Write continuous mode for selected potentiometer instrument
Info		F6	Displays information about selected channel
Desk potentiometer		F7	Links to the Desk potentiometer device
Memo		F8	Stores values for mapping function and sends them to the ECU

This is also the default layout for ECU Hotkeys toolbar that is displayed when the current active window type does not belong to the list described in this chapter.

## ECU Calibration table



COMMAND	ICON	SHORTCUT	DESCRIPTION
Interpolation		F2	Interpolates current selected values for the calibration
Z Axis		F3	Selects the current layer for the calibration (value for Z Axis dimension)
Property		F4	Configures Calibration Table window
Read		F6	Reads selected values from ECU
Write		F7	Writes selected values to ECU
Header		F10	Shows or hides information fields in the window
Value diff.		F8	Shows or hides value difference fields in the window
Comment		F9	Shows or hides comment field in the window

## ECU Calibration 2D Graph



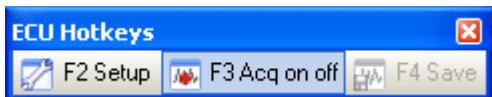
COMMAND	ICON	SHORTCUT	DESCRIPTION
Interp.		F2	Interpolates current selected values for the calibration
Z Axis		F3	Selects the current layer for the calibration (value for Z Axis dimension)
Prop		F4	Configures Calibration Table window
Read		F6	Reads selected values from ECU
Write		F7	Writes selected values to ECU
Value diff.		F8	Shows or hides value difference fields in the window

## ECU Calibration 3D Graph



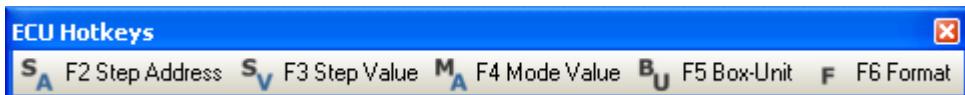
COMMAND	ICON	SHORTCUT	DESCRIPTION
Interpolation		F2	Interpolates current selected values for the calibration
Z Axis		F3	Selects the current layer for the calibration (value for Z Axis dimension)
Property		F4	Configures Calibration Table window
Read		F6	Reads selected values from ECU
Write		F7	Writes selected values to ECU

## Oscilloscope



COMMAND	ICON	SHORTCUT	DESCRIPTION
Setup		F2	Configures Oscilloscope window
Acq on off		F3	Switches acquisition on or off for the Oscilloscope window
Save		F4	Saves data logged for channels in the window to disk (in a file of .ZTX format)

## Read Write



COMMAND	ICON	SHORTCUT	DESCRIPTION
Step Address		F2	Sets focus to Step Address field in the window
Step Value		F3	Sets focus to Step Value field in the window
Mode Value		F4	Sets focus to Mode Address field in the window
Box-Unit		F5	Sets focus to Box-Unit field in the window
Format		F6	Changes the value for Device Format field in the window

## String List



COMMAND	ICON	SHORTCUT	DESCRIPTION
Info		F5	Displays information about current selected item in the window
Refresh		F6	Refreshes the content of the window

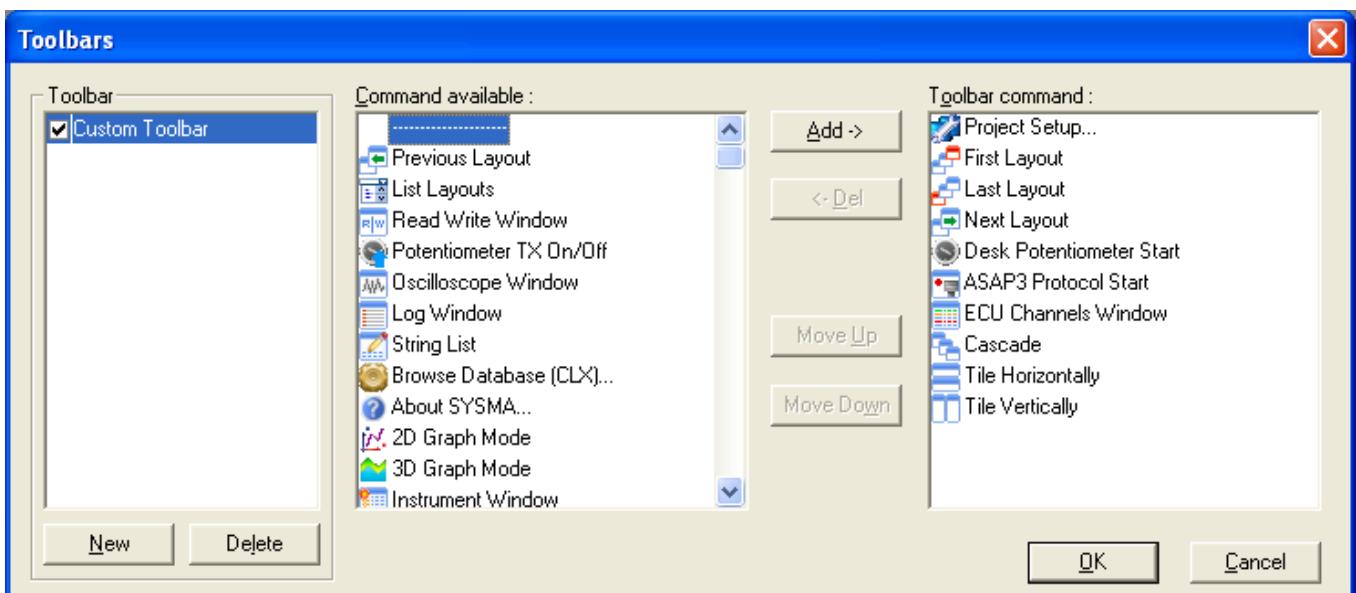
## Browser CLX Database



COMMAND	ICON	SHORTCUT	DESCRIPTION
Property		F4	Configures settings for current selected channels
Read		F6	Reads values for selected channels from ECU
Write		F7	Writes values for selected channels to ECU

## Customize Toolbars

The **Toolbars** window allows to configure the toolbars in SYSMA environment. Select **View / Toolbar / Customize...** command in main menu.



## Toolbar Section

The list shows the currently configured toolbars; the display of each toolbar can be enabled / disabled through the corresponding control box.

The **New** button opens a window to add a new toolbar.

The **Delete** button cancels the toolbar selected in the list.

## Command available

It shows the list of the commands available that can be added to the selected toolbar.

## Toolbar command

It shows the list of the commands configured for the selected toolbar.

## Buttons

They allow to configure the commands available in the selected toolbar.

**Add:** adds the commands selected in the **Command available** list in the toolbar

**Delete:** cancels from the toolbar the commands selected in the **Toolbar command** list.

**Move Up / Move Down:** move the commands selected in the **Toolbar command** list either upwards or downwards inside the toolbar.

# **Setup**

SYSMA has several configuration environments, each one dealing with features and specific management for the application.

In the management of ECU type devices, there are settings that are valid overall the application; these settings don't depend upon the specific loaded project. They relate to configuration of communication protocol with the ECU, management and visualization of analysis windows used with ECU (Read Write and Calibration Table windows), configuration for features for data recording (Data Recorder) and data acquisition (Data Acquisition) of values read from ECU. This configuration environment is in *General Options* window, accessible from *Tools* main menu.

Other settings relative to ECU devices are specific to the particular project loaded, so they are saved in project configuration files. These configurations relate to graphic interface management (use of *Layouts*, visualization for *Instrument* analysis windows), and to features for using ECU devices (*String list* displaying, management of *Timing* communication with devices and other timing activities, *Mapping* of memory areas on ECU, ASAP3 communication protocol, management of *Potentiometer Desk*). This configuration environment is in *Project Setup* window, accessible from *File* main menu.

Data Logger devices environment provides settings that affect communication with data loggers and with the look and feel of related windows (Table windows for tables that are sent to data logger, and *Data Logger Channels* window that shows actual values for channels present on connected data logger). This configuration environment is in *Data Logger Options* window, accessible from *Data Logger* main menu.

Other settings in the application are related to graphical layout and general features: customization of Toolbars (*Customize Toolbars* window that opens with *View / Toolbar / Customize* menu), customization for shortcut command accelerators (*Setup Accelerators* window that opens from *Tool* menu).

User can modify SYSMA all of these settings, save them on disk and load previous configuration files.

This chapter shows where SYSMA Setup environments are described in detail.

- **Project Setup**
- **General Options**
- **DataLogger Options**
- **Customize Toolbars**
- **Customize Accelerators**

# Keyboard Shortcuts

Keyboard shortcuts are combinations of keystrokes that provide easier access to SYSMA commands. Default SYSMA shortcuts are described in following General keyboard shortcuts table: these are the keyboard shortcuts related to the SYSMA menu.

Items in the table are grouped by context menu.

GENERAL SHORTCUTS			
COMMAND	DESCRIPTION	SHORTCUT	CUSTOMIZABLE
<b>File menu</b>			
Open Project	Opens a Project file	<b>Ctrl + O</b>	YES
New Project	Creates a New Project file	<b>Ctrl + N</b>	YES
Print Window	Prints Current Window	<b>Ctrl + Shift + P</b>	YES
<b>Edit menu</b>			
Cut	Cuts from current window	<b>Ctrl + X</b>	YES
Copy	Copies from current window	<b>Ctrl + C</b>	YES
Paste	Pastes to current window	<b>Ctrl + V</b>	YES
Undo	Cancels last operation	<b>Ctrl + Z</b>	YES
Redo	Repeats the last undo operation	<b>Ctrl + Y</b>	YES
Remove Channel	Removes selected channel from active window	<b>Ctrl + Num Del</b>	YES
<b>View menu</b>			
Channel Browser	Shows or hides Channel Browser window	<b>Ctrl + F2</b>	YES
Project Workspace	Shows or hides Project Workspace window	<b>Ctrl + F5</b>	YES
Connection Status	Shows or hides Connection Status window	<b>Ctrl + F6</b>	YES
Read Write Window	Opens or Closes Read Write window	<b>Ctrl + R</b>	YES
Log Window	Shows or hides Log window	<b>Ctrl + L</b>	YES

<b>ECU menu</b>			
Status Box Window	Opens Status Box window	<b>Ctrl + K</b>	YES
String List	Opens String List window	<b>Ctrl + I</b>	YES
2D Graph Mode	Opens 2D Graph window relative to a ECU Calibration Table	<b>Ctrl + G</b>	YES
3D Graph Mode	Opens 3D Graph window relative to a ECU Calibration Table	<b>Ctrl + H</b>	YES
Graph Row/Col	Switches Graph Row/Col mode for 2D Graph window	<b>Alt + /</b>	YES
Read table	Reads values for active Calibration Table from ECU	<b>F6</b>	NO
Write table	Writes values for active Calibration Table to ECU	<b>F7</b>	NO
Show value difference	Shows or hides calibration value difference in Calibration window	<b>F8</b>	NO
Show comment	Shows or hides calibration comment in Calibration window	<b>F9</b>	NO
Show header	Shows or hides header area in Calibration window	<b>F10</b>	NO
Restore old values...	Restores old values in active Calibration Table	<b>Ctrl + Z</b>	YES
Control Step Editor	Edits values on active Calibration Table using Control Step	<b>Ctrl + S</b>	YES
Potentiometer TX On/Off	Transmits Potentiometer desk values	<b>Ctrl + T</b>	YES
Save data to file	Saves data to PQT file for Data Recorder function	<b>Ctrl + Space</b>	YES
Continuous	Switches Data Recorder logging mode (Continuous or not)	<b>Ctrl + Q</b>	YES
Replay Single Step	Simulates ECU session using data file of Data Recorder values step by step	<b>Ctrl + Shift +</b> <b>Space</b>	YES

Replay Continuous	Simulates ECU session using data file of Data Recorder values in Continuous mode	<b>Ctrl + Shift + W</b>	YES
Desk Potentiometer Start	Starts communication with Desk Potentiometer	<b>Ctrl + P</b>	YES
ASAP3 Protocol Start	Starts or Stops ASAP3 Protocol	<b>Ctrl + A</b>	YES
<b>Dashboard</b>			
New Dashboard	Creates New Dashboard Editor Layout	<b>Ctrl + D</b>	YES
<b>Tools</b>			
Excel	Runs Excel application	<b>Ctrl + E</b>	YES
<b>Window</b>			
Window...	Manages the currently open windows	<b>Ctrl + Q</b>	YES
<b>Help</b>			
Help	Display SYSMA Help	<b>F1</b>	NO

In the following table, other shortcuts are displayed, that are used in analysis windows. Items for this table are so grouped by SYSMA window types.

The same shortcut accelerator may execute different commands and functions, depending on the current active window and context.

Note also that all these accelerators are fixed and can't be modified.

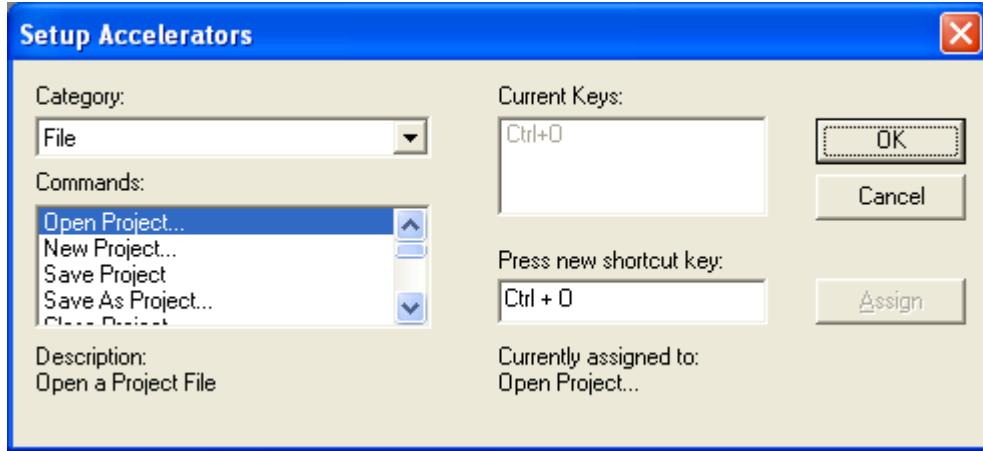
SYSMA windows shortcuts			
COMMAND	DESCRIPTION	SHORTCUT	CUSTOMIZABLE
<b>Instrument window</b>			
Step	Configures the step value to use for selected channel	<b>F2</b>	NO
Map	Enables Mapping function	<b>F3</b>	NO
Write all continuous	Enables Write continuous mode for all Potentiometer instruments in the window	<b>F4</b>	NO
Write continuous	Enables Write continuous mode for selected potentiometer instrument	<b>F5</b>	NO
Info	Displays information about selected channel	<b>F6</b>	NO

Desk potentiometer	Links to the Desk potentiometer device	F7	NO
Memo	Stores values for mapping function and sends them to the ECU	F8	NO
<b>ECU Calibration table</b>			
Interpolation	Interpolates current selected values for the calibration	F2	NO
Z Axis	Selects the current layer for the calibration (value for Z Axis dimension)	F3	NO
Property	Configures Calibration Table window	F4	NO
Read	Reads selected values from ECU	F6	NO
Write	Writes selected values to ECU	F7	NO
Value diff.	Shows or hides value difference fields in the window	F8	NO
Comment	Shows or hides comment field in the window	F9	NO
Header	Shows or hides information fields in the window	F10	NO
<b>ECU Calibration 2D Graph</b>			
Interpolation	Interpolates current selected values for the calibration	F2	NO
Z Axis	Selects the current layer for the calibration (value for Z Axis dimension)	F3	NO
Property	Configures Calibration Table window	F4	NO
Read	Reads selected values from ECU	F6	NO
Write	Writes selected values to ECU	F7	NO
Value diff.	Shows or hides value difference fields in the window	F8	NO
<b>ECU Calibration 3D Graph</b>			
Interpolation	Interpolates current selected values for the calibration	F2	NO
Z Axis	Selects the current layer for the calibration (value for Z Axis dimension)	F3	NO
Property	Configures Calibration Table window	F4	NO
Read	Reads selected values from ECU	F6	NO
Write	Writes selected values to ECU	F7	NO
<b>Oscilloscope</b>			
Setup	Configures Oscilloscope window	F2	NO
Acq on off	Switches acquisition on or off for the Oscilloscope window	F3	NO

Save	Saves data logged for channels in the window to disk (in a file of .ZTX format)	<b>F4</b>	NO
<b>Read Write</b>			
Step Address	Sets focus to Step Address field in the window	<b>F2</b>	NO
Step Value	Sets focus to Step Value field in the window	<b>F3</b>	NO
Mode Value	Sets focus to Mode Address field in the window	<b>F4</b>	NO
Box-Unit	Sets focus to Box-Unit field in the window	<b>F5</b>	NO
Format	Changes the value for Device Format field in the window	<b>F6</b>	NO
<b>String List</b>			
Info	Displays information about current selected item in the window	<b>F5</b>	NO
Refresh	Refreshes the content of the window	<b>F6</b>	NO
<b>Browser CLX DataBase</b>			
Property	Configures settings for current selected channels	<b>F4</b>	NO
Read	Reads values for selected channels from ECU	<b>F6</b>	NO
Write	Writes values for selected channels to ECU	<b>F7</b>	NO

# Customize Accelerators

User can also modify default shortcuts, and even add shortcuts to menu commands available in SYSMA. Open *Setup Accelerators* window with *Tools/Customize Accelerators...* menu.



This window allows configuring the accelerators and the keys allowing a quick access to the commands of the SYSMA environment.

- **Category:** enables to select the item from the main menu of SYSMA, so to filter the list of the commands available in the *Commands* list.
- **Commands:** shows the list of commands that can be associated to an accelerator or a short cut.
- **Current Keys:** shows the key currently associated with the selected command in the *Commands* list.
- **Press new shortcut key:** enables to configure a new shortcut to be associated with the command selected in the *Commands* list.
- **Assign:** associates the shortcut configured in the *Press new shortcut key* field to the command selected in the *Commands* list.

To assign a new accelerator, proceed as follows. First of all select with *Category* and *Commands* the command to be associated to a new accelerator. *Current Keys* shows if an accelerator already exists for this command or not.

Then focus on the *Press new shortcut key* text box and enter the new shortcut.

If the new shortcut has already been assigned to some other command, an alert message appears below the text box and the *Assign* button is disabled.

If the new shortcut has not been used, the *Assign* button is enabled and it must be pressed to confirm the assignment.

To cancel a shortcut without adding new ones, just use the *Delete* key or the *Backspace* key and then confirm with *Assign*.

The choice must be confirmed with *OK* for the changes to become effective.

# Projects

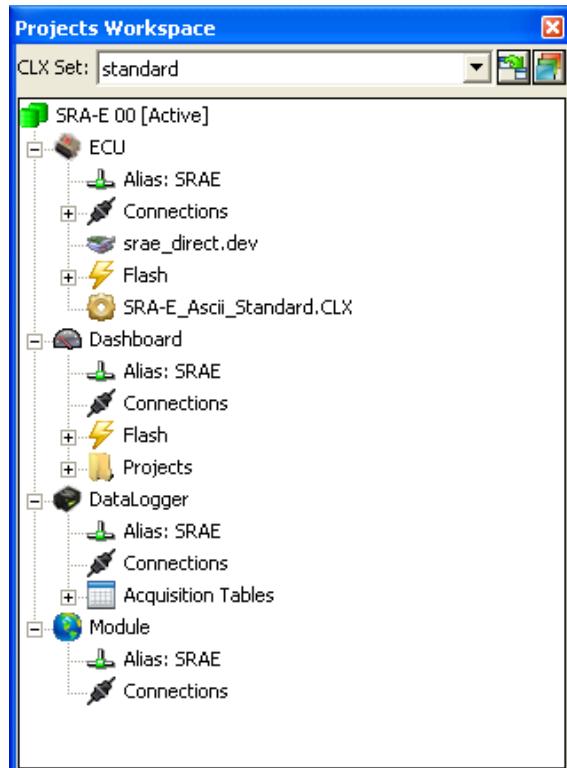
The project collects all information and files necessary for system configuration.

- **Projects Workspace**
- **Project Management**
- **Project Setup**
- **Merge Project**
- **Device Description File (.DEV)**
- **Layout**
- **Database**
- **Import**
- **Print**

## Projects Workspace

*Projects Workspace* window is a special toolbar window that contains information about projects and graphically illustrates their structure. Select *View/Toolbars/Projects* command of the main menu or use right button click on toolbars area to display or hide *Projects Workspace* window. The window can be docked or placed as a floating window in the SYSMA workspace area.

In top area of the window there are controls for managing database *CLX Set*, while the main area shows in a hierarchical tree the structure of projects loaded in current SYSMA session.



## Database CLX Set area

Control items in this area are relative to the current active project and reflect its configuration. The CLX Set management allows preparing multiple sets of calibrations ready to be used. For example the CLX set function can be useful to prepare calibrations to be used in certain weather condition (Rain, Dry...). Another usage could be to split the entire set of calibrations depending by their functions (Engine, brake, gear...). In practice when switching from a CLX set to another, SYSMA substitute the CLX connected to the devices with the CLX prepared in the new set.

In combo *CLX Set* user can switch the database channels set to work with. Button icons on the right allows to create a new copy of the current Database Set (button  ) and open the *Database Set Management* for managing projects Database sets (button  ).

## Projects area

Projects area shows main information for each project loaded in current SYSMA work session, and allows to execute commands for managing them. The layout for this area is a hierarchical tree, build up by several levels and nodes that can be collapsed or expanded.

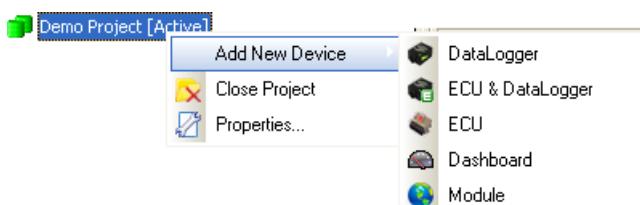
Each project corresponds to a node in the first level of the tree  . When a project is loaded in SYSMA, a new project node will be inserted in the tree, while after user closes a project also its node is removed from the tree. The current active project is marked with a green icon  and a string label on the right of project name [Active]. Use right mouse click on project node and select commands *Set As Active Project* or *Close Project* in the popup menu that appears. Note that only one project can be the active one.

The second level node in the tree corresponds to hardware devices. For each project, up to 4 device types + a "special" one ECU & DataLogger can be configured:

1.  ECU,
2.  DataLogger,
3.  Dashboard,
4.  Module (a generic hardware device),
5.  ECU & DataLogger.

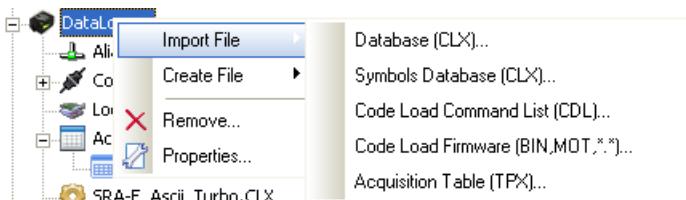
Only one device per type can be added to a project. The special device "ECU & DataLogger" can be added only if no devices of type "ECU" and "DataLogger" are present in the project.

To add a new device in a project use right mouse button click on project node, select *Add New Device* in the pop-up menu and select the desired device in the list:



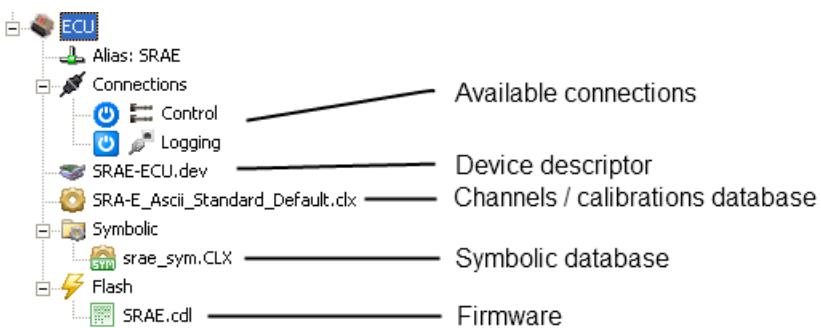
# Common device items

By right click on a device item a popup menu will be displayed with the functions available for that particular device.



In the following sections will be described the options available for every kind of device.

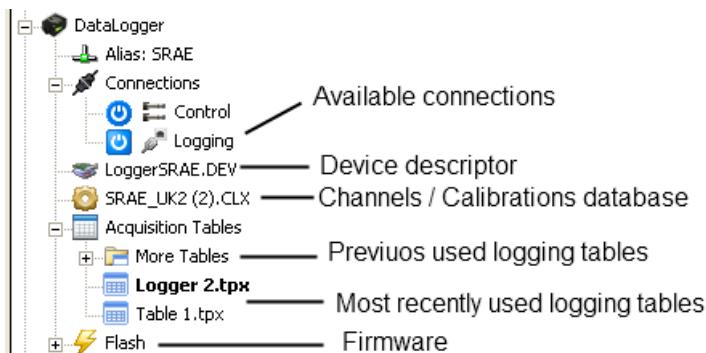
## ECU



The ECU device accepts items of type:

Device Descriptor (.DEV)	It must be present to allow the working of the device. It describes the functions allowed with this device.
Alias Node	It is the alias name used to identify the device in the network. This item can be edited directly (click and write) or selected from a list of available devices by the popup menu.
Connections	Used to connect to the device (double click or click on the icon)
Databases (.CLX)	Can be one or multiple files that describe the channels or calibrations available with this device. Use double click to show the database editor / view window.
Symbolic databases (.CLX)	Are similar to the standard database but it contains items used as debug symbols. Use double click to show the database editor / view window.
Flash (.CDL)	It represents a firmware ready to be loaded into the device. The popup menu "Execute Code Loading" can run the CodeLoad procedure. To show / edit the content of the file you can double click on it.

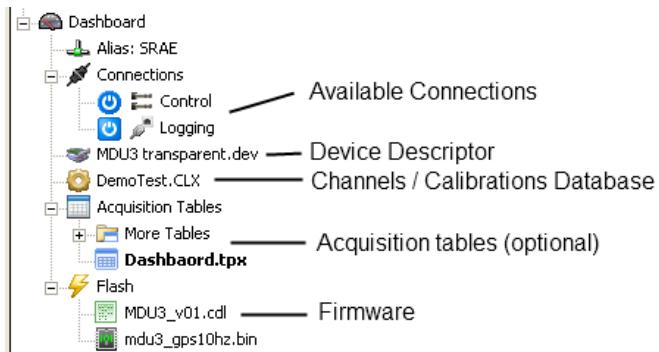
# DataLogger



The DataLogger device accepts items of type:

Device Descriptor (.DEV)	It must be present to allow the working of the device. It describes the functions allowed with this device.
Alias Node	It is the alias name used to identify the device in the network. This item can be edited directly (click and write) or selected from a list of available devices by the popup menu.
Connections	Used to connect to the device (double click or click on the icon)
Databases (.CLX)	Can be one or multiple files that describe the channels or calibrations available with this device. Use double click to show the database editor / view window.
Symbolic databases (.CLX)	Are similar to the standard database but it contains items used as debug symbols. Use double click to show the database editor / view window.
Acquisition Tables (.TPX)	These are the acquisition table used to configure the logger. The most 3 recently used tables are shown at the first level (the bold one is the last used), the others are placed in the sub-node "More tables". The right click menu can move the tables through the 2 containers.
Flash (.CDL)	It represents a firmware ready to be loaded into the device. The popup menu "Execute Code Loading" can run the codeload procedure. To show / edit the content of the file you can double click on it.

# Dashboard



The Dashboard device accepts items of type:

Device Descriptor (.DEV)	It must be present to allow the working of the device. It describes the functions allowed with this device.
Alias Node	It is the alias name used to identify the device in the network. This item can be edited directly (click and write) or selected from a list of available devices by the popup menu.
Connections	Used to connect to the device (double click or click on the icon).
Databases (.CLX)	Can be one or multiple files that describe the channels or calibrations available with this device. Use double click to show the database editor / view window.
Symbolic databases (.CLX)	Are similar to the standard database but it contains items used as debug symbols. Use double click to show the database editor / view window.
Acquisition Tables (.TPX)	These are the acquisition table used to configure the dashboard. The most 3 recently used tables are shown at the first level (the bold one is the last used), the others are placed in the sub-node "More tables". The right click menu can move the tables through the 2 containers.
Flash (.CDL)	It represents a firmware ready to be loaded into the device. The popup menu "Execute Code Loading" can run the codeload procedure. To show / edit the content of the file you can double click on it.

The dashboard device can be found in multiple configurations:

## 1. Connected to a datalogger device via CAN line (defined as "transparent" connection).

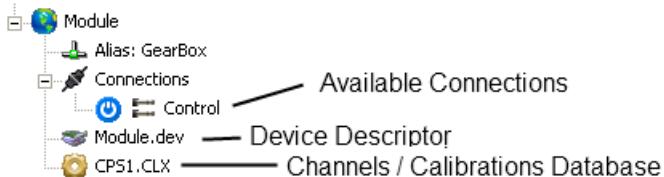
In this configuration, the acquisition table sent to the datalogger programs the device (the device automatically sends the configuration table through the CAN line to the dashboard). No TPX tables can be added to the dashboard because its configuration is linked with the datalogger.

## 2. Standalone dashboard

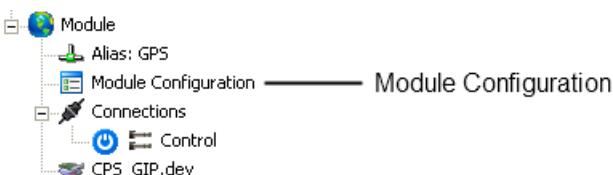
If the dashboard is using this modality (SYSMA can connect to it directly using the "Logging" connection) the acquisition tables can be added to the dashboard node and sent to the device.

## Module

It is a multi-purpose device; his characteristics can be defined in the DEV file. It generally has no specific configuration GUI but can be programmed as a standard device.



If the file DEV is set as "Function = GPSModule" a new node will be displayed to configure the module:



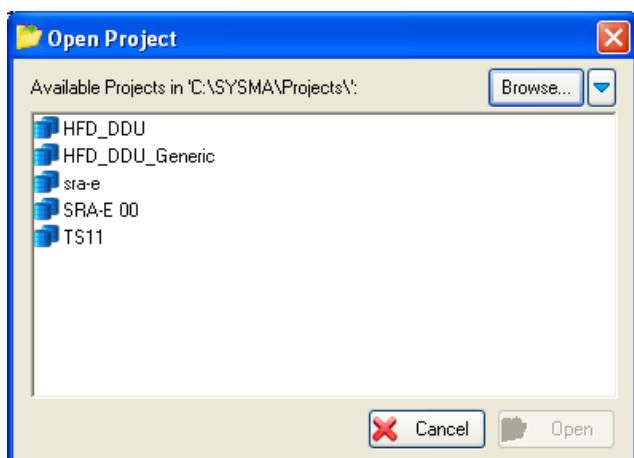
You can double click on the "Module Configuration" item to open the graphical configuration page of the CPS-GIP module.

## Project Management

All commands for managing projects are available in main *File* menu, or in *Projects* toolbar. User can open an existing project file from disk, or create a new one, save modifications done in current project and change file name to project configuration file, or close the project.

## Open

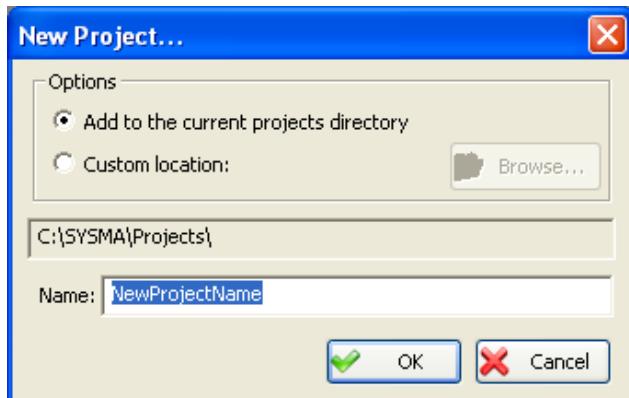
The command allows opening an existing project, loading it from disk.



Select *File / Open Project* from main menu. User can choose a directory path with button *Browse...*, or select an already used path from the list that appears clicking on the arrow button next to *Browse....* Project files available in the selected path are displayed in the main list in *Open Project* window.

## New

This command allows creating a new project configuration file.



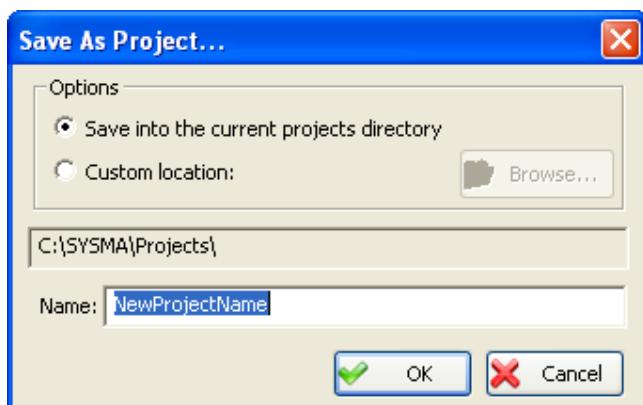
Select *File / New Project* from main menu. In *New Project...* window, choose the option for locating project file on disk (same directory as the current project or another directory, use *Browse* button to select a custom one). Then type the name for the project in *Name* field.

## Save

This command saves modifications for the current project to file. Simply select *File / Save Project*.

## Save As

This command allows saving current project to disk, using a different file name.



Select *File / Save As Project....* In the window that appears user can change directory path (choose option same directory as the current project or select a custom location with *Browse* button), and type the new name for the project in field *Name*.

## Close

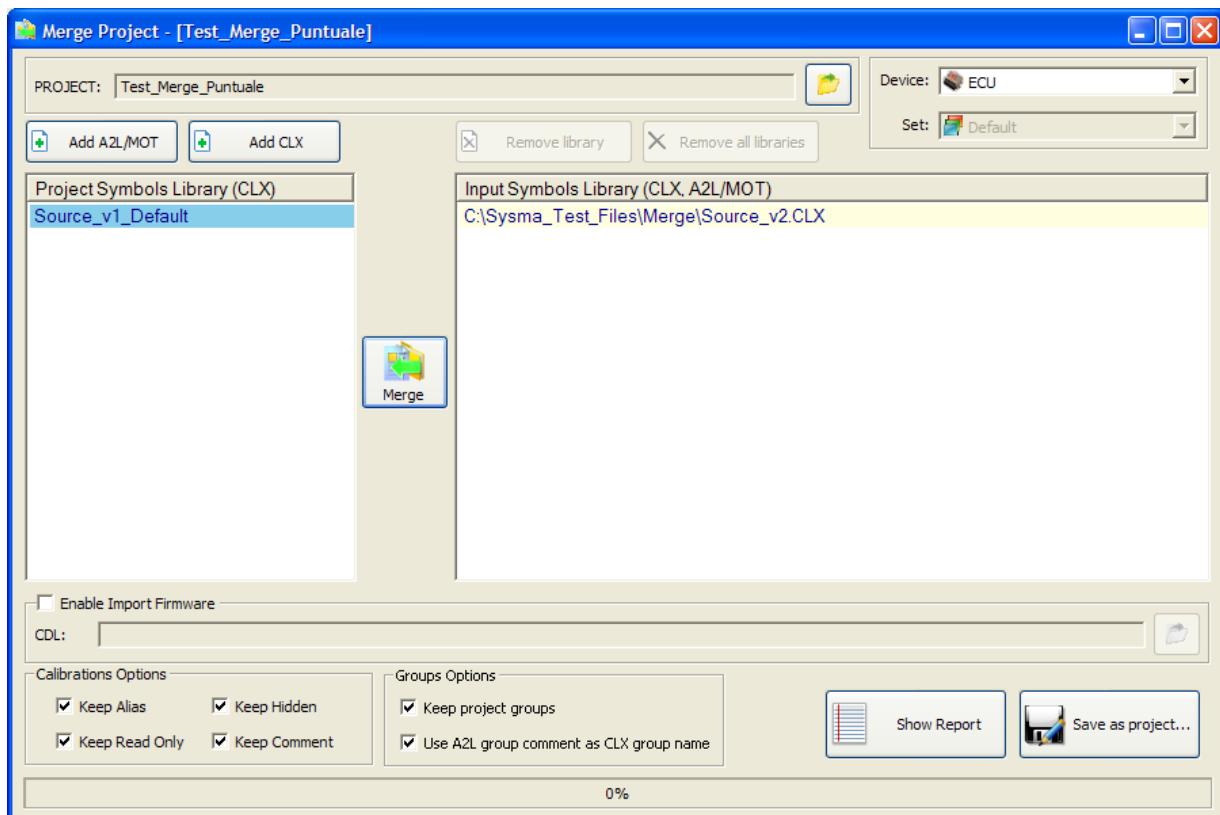
This command closes the current selected project. Select *File / Close Project* from main menu. User will be asked to save modifications to disk if necessary.

## Merge Project

Each time a new firmware version is released, it's necessary to upgrade project Database files (CLX) relative to each device with the information derived by the new code (A2L / MOT). Merge Project command provides an automatic procedure for updating Database files, in order to ensure compliance, so that the project can also be used with the new version of code (e.g. a new firmware ECU). The information that must be update include:

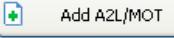
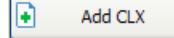
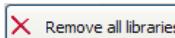
- Measurements,
- Calibrations,
- Groups,
- Boxes.

Note that each "Application" or any Micro must match a set of A2L + MOT or CLX, which should match one or more CLX. The merge function allows upgrading a single device selected from the active project or a project loaded in SYSMA. The update can be performed on all Sets associated with the device or a single Set. Importing one or more pairs of A2L/MOT or CLX associating a set of CLX in the project can perform the merge. The pairs of A2L/MOT or CLX should be the comprehensiveness of the data associated with a device. All the parameters in A2L or CLX will end in CLX associated, with no chance to filter any parameters. Run *File / Merge Project...* from main menu to display *Merge Project* window.



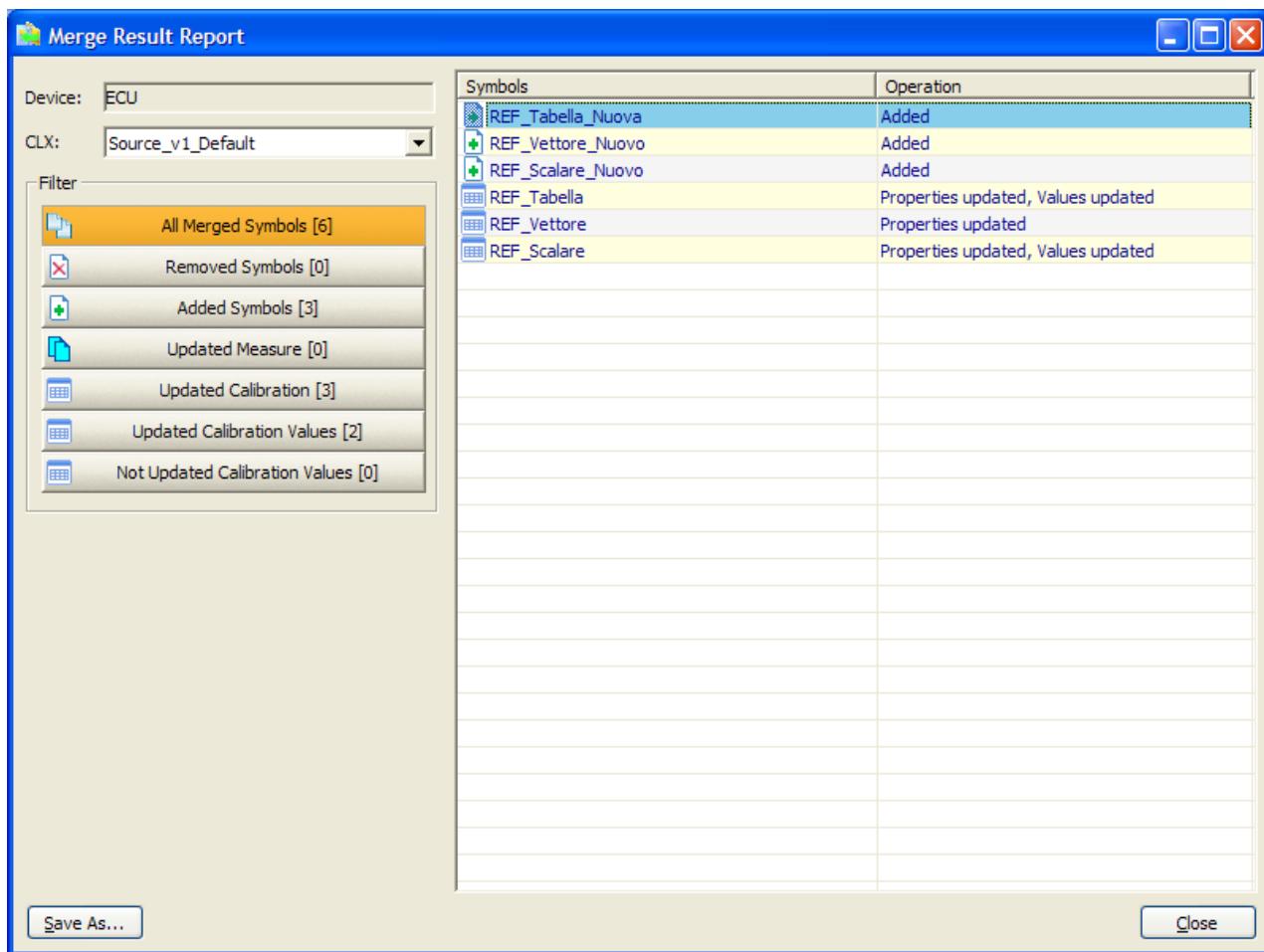
## Merge Procedure

Follow steps in this procedure to upgrade the project:

- Click on browse button  to select a project.
- Select a device (ECU, DataLogger, Dashboard ...) configured in the project (use *Device* combo box).
- Select a single Database Set or all Sets in the project (use *Set* combo box).
- Load a pairs of A2L and MOT files form disk (use buttons  and ,  and  for changing the list of CLX or A2L and MOT files used for the merge).
- Associate each pairs of A2L/MOT to relative Database CLX configured for the selected device.
- Choose in Options section if some definitions relative to calibrations in the project should not be changed by merge operation

<b>Keep Alias</b>	Alias value for all calibrations in the original Database files will be kept
<b>Keep Read Only</b>	Read Only value for all calibrations in the original Database files will be kept
<b>Keep Hidden</b>	Hide value for all calibrations in the original Database files will be kept
<b>Keep Comment</b>	Comments for all calibrations in the original Database files will be kept
<b>Keep project groups</b>	Groups in the original Database files will be kept
<b>Use A2L group comment as CLX group name</b>	Allows the user to select the A2L field that will be used as group name in CLX, group name itself or group comment.

- Run merge command with button . The bar in the bottom area displays the progress for the current operation showing a percentage value.
- SYSMA will display a report for merge operation (button ), so the user can decide to save upgraded project to disk (button ) or not.



*Merge Result Report* window summarizes merge results so that the user can inspect the changes. In *Symbols* list there are all channels upgraded by merge operations. The list can be filtered by Database CLX file using *CLX* combo box, or other filter categories from *Filter* section.

Icon	Filter	Description
	<b>All Merged Symbols</b>	All symbols modified by merge are shown
	<b>Removed Symbols</b>	Symbols removed from CLX file are shown
	<b>Added Symbols</b>	Symbols added to CLX file from A2L configuration are shown
	<b>Updated Measure</b>	Symbols of Measure type modified by merge are shown
	<b>Updated Calibration</b>	Symbols of Calibration type modified by merge are shown
	<b>Updated Calibration Values</b>	Symbols of type Calibration for which the merge has changed the values
	<b>Not Updated Calibration Values</b>	Symbols of type Calibration for which the merge has not updated the values

Changes made by user will be kept after closing the *Merge Project* window.

## Upgrading device Firmware

In *Merge Project* window, user can also upgrade the firmware for a device.

Select the *Enable Import Firmware* option; browse for a .BIN or .CDL file with the button  on the right of *CDL* field.

When running *EXECUTE MERGE*, SYSMA will also overwrite the selected firmware file to the device.

## Rules for upgrading CLX library

SYSMA will apply following rules when upgrading a Database CLX library with merge operation.

### Upgrading Measurements

Research and comparison of measurements will be performed by *Reference name*.

Measurements not present in input A2L or CLX will be removed from Database CLX files.

Measurements present only in input A2L or CLX will be added to Database CLX files.

Measurements present both in input A2L or CLX and Database CLX will be upgraded using definitions from input A2L or CLX.

Configurations present in Database CLX files relative to Signal and CAN message won't be modified.

### Upgrading Calibrations

Research and comparison of calibrations will be performed by *Reference name*. Calibrations present only in input A2L or CLX will be added to Database CLX files. Calibrations present only in A2L will be added to Database CLX files. Values from MOT file are used to set values for calibrations. Calibrations that are compliant and present both in input A2L or CLX and Database CLX will be upgraded using definitions from input A2L or CLX, except for:

<b>calibration values</b>	the ones already present in the Database CLX will be kept
<b>Alias definition</b>	can be upgraded optionally
<b>Read Only definition</b>	can be upgraded optionally
<b>Hidden definition</b>	can be upgraded optionally
<b>Comment definition</b>	can be upgraded optionally

Calibrations present in both A2L and Database CLX are incompliant when there are differences for

- X/Y/Z dimensions
- Data type (BYTE, WORD, LONG ...)
- Output Format (DEC, ASCII ...)
- ABCDK conversion coefficients.

For these channels calibrations present in A2L are copied fully in CLX and calibration values are set as those found in the file MOT.

## Upgrading Groups

Research and comparison of Groups will be performed by *Name*.

Groups not present in input A2L or CLX will be removed from Database CLX files. All symbols included in removed Groups will be still present in the CLX library. Groups present both in input A2L or CLX and Database CLX will be upgraded using definitions from input A2L or CLX except for:

<b>Keep project groups</b>	the ones already present in the Database CLX will be kept
----------------------------	---

## Upgrading Box

*Signature / SubAddress / BoxFunction* will perform Research and comparison of Box. Box not present in input A2L or CLX will be removed from Database CLX files. All symbols included in removed Box will be still present in the CLX library. Box present both in input A2L or CLX and Database CLX will be upgraded using definitions from A2L.

## Merge operation performed via OLE Automation

Merge operation will be available also using SYSMA OLE Automation, with the following features.

**Merge configuration**, where the user must specify

- Device (ECU, DataLogger, Dashboard ...)
- Selection for Database Set (single Set or all Sets)
- names for input A2L / MOT or CLX and relative CLX associated
- File names for BIN/CDL (optionally)

**Execute Merge.**

Run merging operation.

**Save Project.**

Save merged project.

# Device Description File

The Device Description File is a system file with extension .DEV, used by SYSMA to describe in detail, by configuration keys, features and settings of a device. It is conceptually similar to a device driver that is provided with the hardware when you buy a new device to connect to your PC: it describes the features and capability of the device and tells to SYSMA how it can be used. It is necessary to load a Device Description file for each device in SYSMA projects, in order to access the several *functions* of the device itself. Hereafter this file type will also be identified by DEV.

## DEV file structure

A Device Description file is made up by:

A *General* section, with settings that are common to all sections:

### [General]

- **Device\_Name = [name]**
  - This field identifies the device with a unique name.
- **Device\_Type = [Logger, ECU, Dashboard, Module, ECU&Logger]**
  - This field identifies device type, allowing SYSMA to configure it in the corresponding project. When it's added to a project, it allows SYSMA to check if the type is compliant (e.g.: a dev file of type "ECU" cannot be added to a device of type "DataLogger")
- **Sections = n**
  - Number of sections defined in the file

*ECU & Logger (ECU&DataLogger)* stands for a device that has both data logging and engine control features in the same box. Once a device of this type has been added to the project, no new devices of type ECU or DataLogger can be further added.

One or more *SectionN* describing settings for a specific feature or function of the device:

### [Section(n)]

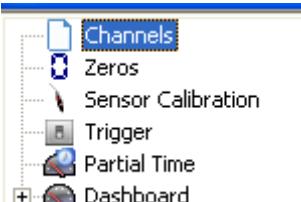
- **Name** = name for the device
- **Function** = [ECU, Logger, Dashboard, GPSModule, Codeload].
  - This key is essential to describe the contents of the section and determine the functionality at the protocol level / device configuration.

Note that SYSMA provides two distinct connection modes:

- **Control** connection allows to manage Calibrations (sending and receiving Calibrations from the device), Read and Write values for parameters in specific memory areas of the device, and other functions usually available on devices used to handle engine control units.

- **Logging** connection allows programming the device with Logging Channels table, managing logging features as Trigger conditions and Zeros, read actual values for logging channels, and other functions usually available on devices used to handle acquisition for telemetry data.

The keys *Name* and *Function* must be present in every section of the DEV file. A structural check will be performed by SYSMA when adding a dev file to the project, if this check fails an error message will be displayed in the log windows and, depending by the error level, the file will not be added to the project. Each section of the DEV files describes a feature of the hardware; the following table provides a brief description of the accepted functions:

Function	Description
<b>ECU</b>	Allows the hardware device to be connected in <i>Control</i> mode and enable the calibrations functions of SYSMA. When this function is found, a node <i>Control</i> will be added in the <i>Connections</i> nodes of the device (and a corresponding button will be displayed in the connections toolbar)  Control .
<b>DataLogger</b>	Allows the hardware device to be connected in <i>Logging</i> mode and enable the datalogger programming functions of SYSMA. If it's active, new acquisition tables can be created or imported and, if connected, sent to the device. When this function is found, a node <i>Logging</i> will be added in the <i>Connections</i> nodes of the device (and a corresponding button will be displayed in the connections toolbar)  Logging .
<b>Dashboard</b>	Allows the configuration of the dashboard specification: internal channels, dashboard model, display visualization settings. Generally these settings are transmitted to the hardware through the acquisition table (TPX) so this function causes the visualization of the node <i>Dashboard</i> to the TPX configuration window. Depending by the model various settings can be applied to configure the dashboards fields.   <p>NOTE: Depending on the hardware in use a DEV file describing a dashboard item can contain also a function of type <i>ECU</i> (if the dashboard can receive calibration tables) or <i>DataLogger</i> (for example if the dashboard is in a standalone configuration so it can be connected with a standard datalogger connection and can receive his TPX configuration table).</p>
<b>GPSModule</b>	Allows the visualization of the GPS configuration environment and sets its communication parameters. This function can be added to 2 different DEV files: <ul style="list-style-type: none"> <li>• A dashboard DEV file if the GPS hardware is <b>integrated</b> into a MDU dashboard (the configuration page is shown in the TPX acquisition table window);</li> <li>• A generic module file if the hardware is <b>standalone</b> and connected to the standard CAN/Ethernet line.</li> </ul> <p>NOTE: If the GPS module is integrated into the MDU dashboard, its <i>GPSModule</i> section must be inserted into the MDU dashboard's DEV file, otherwise, if it's standalone hardware, a specific DEV file must be created.</p>

There are also **specific sections** that don't follow the logic used for previous, so they are described independently.

For *Graphic Dashboard* (`Device_Type = Dashboard`) types (e.g. type DDU01) an additional **[Graphical]** section may be defined (if supported by the device), that will include settings for graphic layout section, which are used in the Dashboard Editor environment.

For devices that support firmware update, an additional **[CodeLoad]** section will be defined, that will include settings for this function.

## Practical DEV Samples:

The function described above usually must be combined in order to obtain a descriptor of a real hardware system. Here are provided 2 examples to clarify the usage of the DEV files.

System: Dashboard MDU that can be connected to transmit TPX and to transmit calibration tables. Can be programmed with firmware.

DEV file: **Device\_Type = Dashboard** + functions: **Dashboard + DataLogger** (enable Logging connection) + **ECU** (enable Control connection) + **Special Section [CodeLoad]**

System: DataLogger that can be connected to transmit TPX and to transmit calibration tables.

DEV file: **Device\_Type = Logger** + functions: **DataLogger** (enable Logging connection) + **ECU** (enable Control connection)

## List of keys valid for *ECU* function

### [General]

Key	Valid values	Description
<b>Buffer_pc</b>	Integer	Size in bytes for buffer used for CONNECT_REQUEST (CR)
<b>Transp_Buffer_Timeout</b>	Integer	Multiplication factor for calculating buffering time for TCP/IP transparent (Temp = 100mS * Transp_Buffer_Timeout).
<b>Transp_Buffer_Tx</b>	Integer 0 to 4	Enable mode buffered TX 0 - no buffering operation level is done by the PC 1 - the PC activates buffering operation on data, not on commands; if the processor acts as a router, buffering operation when receiving from ECU is driven by <i>Transp_buffer_timeout</i> key, which is set by the PC at every command run. 2 - the PC activates buffering operation on data, not on commands; if the processor acts as a router, buffering operation when receiving from

		<p>ECU is driven by <i>Transp_buffer_timeout</i> key, which is set once only by the PC at protocol start.</p> <p>3 - the PC activates buffering operation on both data and commands; if the processor acts as a router, buffering operation when receiving from ECU is driven by <i>Transp_buffer_timeout</i> key, which is set by the PC at every command run.</p> <p>4 - the PC activates buffering operation on both data and commands; used only with a Bluetooth communication line.</p>
<b>Transp_Session_Mode</b>	"MULTI_PC" "SINGLE_PC"	Connection mode in TCP/IP transparent
<b>SuperBuffer_enable</b>	"TRUE" "FALSE"	Enable "SuperBuffer" management for MTP protocol
<b>Transp_Read_Timeout</b>	Integer	Timeout for reading single packet
<b>Transp_Session_Timeout</b>	Integer	Timeout for opening TCP/IP transparent in MULTI_PC mode
<b>Transp_MTP_timeout1</b>	Integer	Configuration timeout for transparent line
<b>ACK_CAN_card</b>	0 / 1	Enable acknowledge on CAN line
<b>Trsp_CanLine</b>	Integer	Set CAN line to transparent
<b>Can_Filter</b>	Hex Number	Filter on CAN line for input packets detection
<b>Inactivity_timeout</b>	Integer (ms)	Time threshold for a device to be considered in timeout status, (default 2000)
<b>EthPort</b>	Integer	Port used for UDP communication protocols (default 3000)

### [Section]

Key	Valid Values	Description
<b>MT851_Baud_Rate_CAN</b>	Integer	Set baud rate on CAN line, depending on key MT851_Registry
<b>MT851_Registry</b>	Hex Number	Set baud rate on CAN line, with priority on key MT851_Baud_Rate_CAN
<b>Buffer</b>	Integer [0, 16, 32, 64, 128, 256, 1024, 2048, 4096, 8192, 16384, 32768, 65536]	Size for transmission buffer, valid for protocols CAN and RS232 (default 256)
<b>Superbuffer</b>	Integer	Size for superbuffer (default 4096)

<b>TranspLineType</b>	“LOCAL” “CAN” “SERIAL” “ARCNET” “MM_GENERIC”	Transparent line type
<b>TranspLineNum</b>	Integer	Set the number for the line on which device is connected in transparent mode
<b>Transp_Buffer_Timeout</b>	Integer	Multiplication factor for calculating buffering time for TCP/IP transparent (Temp = 100mS * Transp_Buffer_Timeout)
<b>Signature</b>	Hex Number	Identifier for MTP protocol target device
<b>Delay</b>	Integer	CAN packets timer (in millisecond) to avoid overrun for Device (managed also for transparent mode)
<b>CmdBox</b>	Hex Number	ID_CAN of command type packets input on PC
<b>CmdPC</b>	Hex Number	ID_CAN of command type packets output from PC to device
<b>DataBox</b>	Hex Number	ID_CAN of data type packets input on PC
<b>DataPC</b>	Hex Number	ID_CAN of data type packets output from PC to device
<b>CmdBox2</b>	Hex Number	alternative to CmdBox for PC=2
<b>CmdPC2</b>	Hex Number	alternative to CmdPC for PC=2
<b>DataBox2</b>	Hex Number	alternative to DataBox for PC=2
<b>DataPC2</b>	Hex Number	alternative to DataPC for PC=2
<b>CmdBox3</b>	Hex Number	alternative to CmdBox for PC=3
<b>CmdPC3</b>	Hex Number	alternative to CmdPC for PC=3
<b>DataBox3</b>	Hex Number	alternative to DataBox for PC=3
<b>DataPC3</b>	Hex Number	alternative to DataPC for PC=3
<b>CmdBox4</b>	Hex Number	alternative to CmdBox for PC=4
<b>CmdPC4</b>	Hex Number	alternative to CmdPC for PC=4
<b>DataBox4</b>	Hex Number	alternative to DataBox for PC=4
<b>DataPC4</b>	Hex Number	alternative to DataPC for PC=4
<b>AddType</b>	“PROCESSOR” “EEPROM”	Unit type description

<b>AddAlias</b>	Hex Number	Master address for Eeprom processor
<b>AddCodeDts</b>	Hex Number	Start address for Data Sens application tool
<b>Num_Addr</b>	Integer 0 – 20	Number of SubAddress (Micro) present on current Box
<b>AddLabel&lt;N&gt;</b>	Text	Name for SubAddress (Micro) <N>
<b>AddDA&lt;N&gt;</b>	Hex Number (0x00 ... 0xFF)	Destination Address of SubAddress (Micro) <N>
<b>AddMemBit&lt;N&gt;</b>	Integer 8, 16, 32	Mapping type information of SubAddress (Micro)

## List of keys valid for *DataLogger* function

### [General]

Key	Valid values	Description
<b>ARCNet_Line1_Mode</b> <b>ARCNet_Line2_Mode</b> <b>ARCNet_Line3_Mode</b> <b>ARCNet_Line4_Mode</b>	“ATP0” “ATP1” “ATP2” “XTP2”	Mode for ARCNet1, ARCNet2, ARCNet3, ARCNet3 line
<b>SCI_Line1_Mode</b> <b>SCI_Line2_Mode</b>	“ATP0” “ATP1” “ATP2” “XTP2”	Mode for SCI1 / SCI2 line
<b>Transp_CanFilter</b>	Hex Number	Filter CAN Transparent
<b>Transp_Read_Timeout</b>	Integer	Timeout for reading packet Transparent mode (ms)
<b>Transp_Session_Timeout</b>	Integer	Timeout for opening TCP/IP transparent in MULTI_PC mode (ms)
<b>Transp_Session_Mode</b>	“MULTI_PC” “SINGLE_PC”	TCP/IP transparent connection mode
<b>ChannelUnits</b>	“on” / “off”	Enable management for generating “Channel Units” sub table.

### [Section]

Key	Valid values	Description
<b>AcqMemoryAvailable</b>	Integer	Amount of memory available for device, expressed in Kbytes

<b>Logger_Model</b>	"TS11" "TS10" "MVL" "FLEX"	Datalogger Type
<b>General_Max_Frequency</b>	Integer	Key for multiple configuration of logging frequencies (this key doesn't take effect if in box section is defined a key for specific frequency configuration i.e. DSTBufferedMaxFrequency)
<b>AcqMaxByteRate</b>	Integer	Available band for logging, expressed in Bytes/sec
<b>AcqMaxChannels</b>	Integer	Max number of channels available for logging
<b>AcqMaxFrequency</b>	Integer	Max frequency available for channels logging, expressed in Hertz
<b>RTMaxByteRate</b>	Integer	Available band for RealTime logging, expressed in Bytes/sec
<b>RTMaxChannels</b>	Integer	Max number of channels available for RealTime logging
<b>RTMaxFrequency</b>	Integer	Max frequency for RealTime logging, expressed in Hertz
<b>BurstMaxByteRate</b>	Integer	Available band for Burst logging, expressed in Bytes/sec
<b>BurstMaxByteRateWithDST</b>	Integer	Max Burst rate for DST
<b>BurstMaxChannels</b>	Integer	Max number of channels available for Burst logging
<b>BurstMaxFrequency</b>	Integer	Max frequency for logging Burst channels, expressed in Hertz
<b>NBTMaxByteRate</b>	Integer	Available band for NBT logging, expressed in Bytes/sec
<b>NBTMaxChannels</b>	Integer	Max number of channels available for NBT logging
<b>NBTMaxFrequency</b>	Integer	Max frequency for logging NBT channels, expressed in Hertz
<b>DSTBufferedMaxByteRate</b>	Integer	Available band for DST Buffered logging, expressed in Bytes/sec
<b>DSTBufferedMaxChannels</b>	Integer	Max number of channels available for DST Buffered logging
<b>DSTBufferedMaxFrequency</b>	Integer	Max frequency for logging DST Buffered channels, expressed in Hertz
<b>DST_Buffer_Tot</b>	Integer	Size of DST buffer in <b>Kbytes</b>
<b>DST_Max_transmission_rate</b>	Integer	Max rate for DST transmission in <b>Byte</b>
<b>TwinTableResolution</b>	"B100ms"	Resolution for Pre and Post Trigger threshold values relative to HF Triggers: <ul style="list-style-type: none"><li>• B100ms: resolution in tenths of a second</li><li>• Default: resolution in seconds</li></ul>

<b>LDPMaxByteRate</b>	Integer	Rate On Board Diagnostic
<b>LDPMaxChannels</b>	Integer	Channels On Board Diagnostic
<b>LDPMaxFrequency</b>	Integer	Frequency On Board Diagnostic
<b>HDLCSlotMaxByteRate</b>	Integer	Max size for HDLC slot
<b>FDL_Enable</b>	Integer	Enable FDL logging if different from 0
<b>FDL_disk_size</b>	Integer	Max size in bytes on disk for storing FDL data (default = 1000000)
<b>FDL_Latest_Data</b>	Integer	If different from 0, datalogger is allowed to clear old data
<b>FDLParameterLabel0</b>	Text	Label for parameter 0 in FDL configuration page
<b>FDLParameterLabel1</b>	Text	Label for parameter1 in FDL configuration page
<b>FDLParameterLabel2</b>	Text	Label for parameter 2 in FDL configuration page
<b>FDLParameterLabel3</b>	Text	Label for parameter 3 in FDL configuration page
<b>FDLParameterLabel4</b>	Text	Label for parameter 4 in FDL configuration page
<b>FDLParameterLabel5</b>	Text	Label for parameter 5 in FDL configuration page
<b>AcquisitionMode</b>	Text	<p>Trigger events enabling:</p> <ul style="list-style-type: none"> <li>• <b>MDR_DST_Events</b>, enable MDR DST events</li> <li>• <b>MDR_Cable_Events</b>, enable MDR Cable events</li> <li>• <b>MDR_Events</b>, enable MDR DST and MDR Cable events</li> <li>• <b>Default</b>, events disabled</li> </ul>
<b>TrackRunCounter</b>	"On" "Off"	Enable "Set Track Run" functions
<b>DoubleFrequency</b>	"On" "Off"	Enable management for double frequency logging
<b>CanStdRange</b>	"On" "Off"	Enable management for ID extended (standard) for CAN packets
<b>MaxPreTrigger</b>	Integer	Max pre-trigger (in seconds, default 3)
<b>MaxPreTriggerAB</b>	Integer	Max pre-trigger AB (in seconds, default 3)
<b>CanAcqGenEn</b>	Integer 0/1	Enable management for generic CAN logging
<b>CanAcqGenLines</b>	Integer 1 - 4	Max number of generic CAN lines supported (default 2)
<b>CanAcqGenLine1MaxMsg</b>	Integer	Max number of message supported for CAN1 line (default 12)

<b>CanAcqGenLine2MaxMsg</b>	Integer	Max number of message supported for CAN2 line (default 12)
<b>CanAcqGenLine3MaxMsg</b>	Integer	Max number of message supported for CAN3 line (default 12)
<b>CanAcqGenLine4MaxMsg</b>	Integer	Max number of message supported for CAN4 line (default 12)
<b>CanAcqGenMaxSignals</b>	Integer	Max number of generic CAN signals that can be logged (total limit for all CAN lines enabled) - default 64
<b>Num_Addr</b>	Integer 0 - 20	Number of SubAddress (Micro) present on current Box
<b>AddLabel&lt;N&gt;</b>	Text	Name for SubAddress (Micro) <N>
<b>AddDA&lt;N&gt;</b>	Hex Number (0x00 ... 0xFF)	Destination Address for SubAddress (Micro) <N>
<b>AddMaxL&lt;N&gt;</b>	Integer	Value MaxL for managing ARCNet
<b>ARCNETUnitOffset&lt;N&gt;</b>	Integer	Offset for channel table in ARCNet unit
<b>ARCNET LINE</b>	Integer	Index of ARCNet line used by micro
<b>ARCNET NODE</b>	Integer	Physical address of a Box on an ARCNet line
<b>SERIAL LINE</b>	Integer	ATP2 (Arcnet) management for SCI channels, SCI line index used by device
<b>Signature</b>	Hex Number	Identifier for MTP protocol target device
<b>AcqMemoryAvailable</b>	Integer	Amount of memory reserved on device for logging data operations
<b>Max_Acq_Freq</b>	Integer	Max limit for logging frequency

## List of keys valid for *Dashboard* function

### [Section]

Key	Valid values	Description
<b>Dashboard_Model</b>	"HDU01" "MT940" "DDU01" "MDU3" "MDU2"	Used to specify dashboard model

<b>Dashboard_Line</b>	"CAN1" "CAN2" "CAN3"	Used to identify CAN line that physically connects dashboard to logger
-----------------------	----------------------------	--

Specific to **DDU01** model

<b>Dashboard_Num_Leds</b>	Integer	Number of alarm led
<b>DashMaxByteRate</b>	Integer	Max Byte Rate for dashboard channels

Specific to **HDU01** model

<b>Dashboard_7segment_display</b>	"Yes" "No"	Management for 7 segment display
<b>Dashboard_Num.Buttons</b>	Integer 0 - 255	Number of buttons available for scroll

Specific to **MDU2** and **MDU3** models

<b>Dashboard_Num_Ch</b>	Integer 0 - 48	Number of external channels that can be handled
<b>Dashboard_NumIntChns</b>	Integer	Number of internal channels
<b>IntCh&lt;N&gt;_Name</b>	Text	Name for internal channel / analogic input N
<b>IntCh&lt;N&gt;_PinNumber</b>	Integer	Pin for internal channel / analogic input N
<b>IntCh&lt;N&gt;_InputType</b>	"None" "AN_Input" "PT1000" "NTC"	Sensor type for analogic input N
<b>IntCh&lt;N&gt;_SrcDataType</b>	"T_BYTE" "T_WOR" "T_DWORD" "T_SBYTE" "T_SWOR" "T_SDWORD" "T_FLOAT3" "T_STRING"	Data type for internal channel / analogic input N
<b>IntCh&lt;N&gt;_OutFormat</b>	"OUTFMT_HEX" "OUTFMT_HEXLZ" "OUTFMT_DEC" "OUTFMT_DECLZ" "OUTFMT_ASCII" "OUTFMT_BIN"	Type of representation for internal channel / analogic input N

<b>IntCh&lt;N&gt;_Decimals</b>	Integer	Number of decimal used for representation for internal channel / analogic input N
<b>IntCh&lt;N&gt;_Elaboration</b>	"ELAB_NONE" "ELAB_GAIN_OFFSET" "ELAB_POLY_LINE"	Elaboration type for internal channel / analogic input N
<b>IntCh&lt;N&gt;_ElabLine_NumDec</b>	Integer	Number of decimal used for LINE elaboration
<b>IntCh&lt;N&gt;_ElabLine_OffsetValue</b>	float	Value for field Offset (Elab LINE) for internal channel / analogic input N
<b>IntCh&lt;N&gt;_ElabLine_GainValue</b>	float	Value for field Gain (Elab LINE) for internal channel / analogic input N
<b>IntCh&lt;N&gt;_ElabPolyLine_NumBP</b>	Integer	Number of Break Points for POLYLINE elaboration that follows
<b>IntCh&lt;N&gt;_ElabPolyLine_BPIn</b>	Array of float (comma separator)	Series of real actual values which constitute the step at the bottom of POLYLINE table
<b>IntCh&lt;N&gt;_ElabPolyLine_BPOut</b>	Array of float (comma separator)	Series of real actual values which constitute the step at the top of POLYLINE table
<b>IntCh&lt;N&gt;_Comment</b>	Text	Comment for internal channel / analogic input
<b>LabelLED&lt;N&gt;</b>	Text	Label for alarm led N
<b>Dashboard_Num_ExtLamp</b>	Integer	Number of labels "External Lamp" that follow
<b>LabelExtLamp&lt;N&gt;</b>	Text	Label relative to external lamp N
<b>SendCANMaxFreq</b>	Integer	Max Freq for CAN packets
<b>SendCANPktRate</b>	Integer	Max number of CAN packets that can be transmitted in a second
<b>CAN1flags</b>	"CAN_FLAG_TERM_ON" "CAN_FLAG_TERM_OFF"	Flag terminator for CAN1 line
<b>CAN2flags</b>	"CAN_FLAG_TERM_ON" "CAN_FLAG_TERM_OFF"	Flag terminator for CAN2 line
<b>CANPkt&lt;N&gt;_ID</b>	Hex value	ID Packed CAN N
<b>CANPkt&lt;N&gt;_LINE</b>	Text	Transmission line for packet CAN N
<b>CANPkt&lt;N&gt;_FREQ</b>	Text	Transmission frequency for packet CAN N
<b>CANPkt&lt;N&gt;_DLC</b>	Integer	DLC packet CAN N

<b>CANPkt&lt;N&gt;_NumChIndexes</b>	Integer	Number of channel indexes associated to packet CAN N
<b>CANPkt&lt;N&gt;_Ch&lt;X&gt;</b>	Hex value	Index channel X associated to packet CAN N

<N> = progressive index

<X> - progressive index of the channel associated to packet default CAN

## List of keys valid for **GPSModule** function

Note: GPSModule device can operate in two modes:

- Integrated (in a MDU dashboard)
- Standalone (as an independent external module).

In order to configure it in *Integrated* mode, its section must be inserted in the same DEV used for the dashboard; in order to configure it in *Standalone* mode, its section must be inserted in DEV used for external module

### [Section]

Key	Valid values	Description
<b>Line</b>	"ETH" "CAN"	Line used to configure module (default = ETH)
<b>Buffer</b>	Integer	Size in bytes of transmission buffer - for CAN line (default 256)
<b>CmdBox</b>	Hex Number	ID_CAN of command type packets input on PC - for CAN line
<b>CmdPC</b>	Hex Number	ID_CAN of command type packets output from PC to device - for CAN line
<b>DataBox</b>	Hex Number	ID_CAN of data type packets input on PC - for CAN line
<b>DataPC</b>	Hex Number	ID_CAN of data type packets output from PC to device - for CAN line
<b>Signature</b>	Hex Number	Identifier for MTP protocol target device - for CAN line
<b>Can_Filter</b>	Hex Number	Filter on CAN line for incoming packets detection - for CAN line
<b>AddDA</b>	Hex Number (0x00 ... 0xFF)	Device Destination Address - for CAN line

## List of keys valid for *Graphic Dashboard* function

### [General]

Key	Valid values	Description
<b>Transp_Read_Timeout</b>	Integer	Timeout for reading packet
<b>Transp_Session_Timeout</b>	Integer	Timeout in opening TCO/IP transparent in MULTI_PC mode
<b>Transp_Session_Mode</b>	"MULTI_PC" "SINGLE_PC"	Connection mode in TCP/IP transparent
<b>Transp_Buffer_Tx</b>	Integer 1/0	Enable TX buffered mode
<b>Buffer_pc</b>	Integer	Size in bytes of buffer for CONNECT_REQUEST (CR)
<b>Can_Filter</b>	Hex Number	Filter on CAN line for incoming packets detection
<b>Trsp_CanLine</b>	Integer	Set CAN line to transparent

### [Graphical]

Key	Valid values	Description
<b>Dashboard_Model</b>	"HDU01" "DDU01"	Dashboard model
<b>Width</b>	Integer	Width in pixel for graphic display (default 320)
<b>Height</b>	Integer	Height in pixel for graphic display (default 240)
<b>Width_Display_Satellite</b>	Integer	Width in pixel for satellite display (default 0)
<b>Height_Display_Satellite</b>	Integer	Height in pixel for satellite display (default 0)
<b>CmdBox</b>	Hex Number	ID_CAN for command type packets input on PC
<b>DataBox</b>	Hex Number	ID_CAN for command type packets output from PC to device
<b>CmdPC</b>	Hex Number	ID_CAN for data type packets input on PC
<b>DataPC</b>	Hex Number	ID_CAN for data type packets output from PC to device
<b>Signature</b>	Hex Number	Identifier for MTP protocol target device
<b>Buffer</b>	Integer	Size in Bytes for transmission buffer (default 256)

<b>AddDA&lt;N&gt;</b>	Hex Number (0x00 ... 0xFF)	Destination Address for SubAddress (Micro) <N>
<b>Line</b>	"ETHERNET" "CAN"	Communication line used to transmit configurations to device (default ETHERNET)
<b>InternalCh&lt;N&gt;</b>	Text, Integer	Data for internal channel: Name, Number of decimals. Default, Decimals = 0, Max = 3
<b>Page&lt;N&gt;</b>	Text	Name for the page available on the device for configuration

<N> = progressive index.

## List of keys valid for **CodeLoad** function

The general configuration keys for the CodeLoad function must be placed in the [CodeLoad] section:

### [CodeLoad]

Key	Valid values	Description
<b>Transp_Read_Timeout</b>	Integer	Timeout for reading packet
<b>Transp_Session_Timeout</b>	Integer	Timeout for opening TCP/IP transparent in MULTI_PC mode
<b>Transp_Session_Mode</b>	"MULTI_PC" "SINGLE_PC"	Connection mode in TCP/IP transparent
<b>Transp_Buffer_Tx</b>	Integer 1 / 0	Enable buffered TX mode
<b>Transp_Buffer_Timeout</b>	Integer	Multiplication factor for calculating buffering time for TCP/IP transparent (Temp = 100mS * Transp_Buffer_Timeout)
<b>EthPort</b>	Integer	Ethernet ports for communication (default 30000)

Next to the general CodeLoad section must be added one or more CodeLoad-specific boxes in the format: [CodeLoad-Box0] – [CodeLoad-Box<N>] where <N> is a progressive index.

### [CodeLoad-Box0]

Key	Valid values	Description
<b>Name *</b>	String	Box Name visible in CodeLoad job editor

<b>Can_Filter</b>	Hex Number	Filter on CAN line for detecting incoming packets
<b>IP_Address_Location</b>	Hex Number	Memory address on the device used for Set / Get IP commands
<b>Protocol</b>	"MTP" "MTP4"	Version of the protocol to be used (default = MPT)
<b>BroadCast</b>	Integer 1 / 0	Enable / disable waiting for broadcast signal before starting operations (default = 0)
<b>Delay</b>	Integer	Timer (in millisecond) between CAN packets to avoid overrun on Device
<b>MT851</b>	Hex Number	Value that shows opening mode of CAN (1MB / 500K) for MT851 adapter (default for other types 0x8023)
<b>CmdBox</b>	Hex Number	ID_CAN of command type packets input on PC
<b>CmdPC</b>	Hex Number	ID_CAN of command type packets output from PC to device
<b>DataBox</b>	Hex Number	ID_CAN of data type packets input on PC
<b>DataPC</b>	Hex Number	ID_CAN of data type packets output from PC to device
<b>Signature</b>	Hex Number	Identifier for MTP protocol target device
<b>Buffer</b>	Integer [0, 16, 32, 64, 128, 256, 1024, 2048, 4096, 8192, 16384, 32768, 65536]	Size for transmission buffer of the device
<b>TranspLineNum</b>	Integer	Set number for the line on which device is connected in transparent
<b>Num_Addr</b>	Integer 0 - 20	Number of SubAddress (Micro) present in current Box
<b>AddLabel&lt;N&gt;</b>	Text	Name for SubAddress (Micro) <N>
<b>AddDA&lt;N&gt;</b>	Hex Number (0x00 ... 0xFF)	Destination Address for SubAddress (Micro) <N>

\* Required field.

<N> = progressive index

## **Example of DEV file for a device with ECU / Datalogger / Codeload functions**

### **[General]**

```
Trsp_Canline      = 0
Transp_Read_TimeOut = 1000
Transp_Session_TimeOut = 5000
Transp_Session_Mode = MULTI_PC
Transp_Buffer_Tx = 2
Transp_Buffer_Timeout = 1
Device_Name = SRAE
Device_Type = ECU&Logger
```

### **[Section0]**

```
Name      = SRAE
Function  = DataLogger
General_Max_Frequency = 200
AcqMemoryAvailable = 8
AcqMaxChannels = 128
RTMaxChannels = 0
BurstMaxChannels = 0
DSTBufferedMaxChannels = 0
DSTMaxChannels = 0
AcqMaxByteRate = 10000
AcqMaxFrequency = 200
BurstMaxByteRate = 0
RTMaxByteRate = 0
Logger_Model = MVL
Signature = 0x000000600
TrackRunCounter = On
CanStdRange = OFF
DoubleFrequency = OFF
Num_Addr = 0
```

### **[Section1]**

```
Name      = SRT
Function  = ECU
Line     = CAN
Buffer    = 256
CmdBox   = 0x0400
DataBox  = 0x0401
CmdBox2  = 0x0410
DataBox2 = 0x0411
CmdPc    = 0x0440
DataPc   = 0x0441
CmdPc2   = 0x0442
DataPc2  = 0x0443
Signature = 0x0000160A
Delay    = 0
MT851    = 0x8014
```

Num_Addr	= 3
AddLabel0	= SH7058
AddDA0	= 0xE0
AddMemBit0	= 8
AddMaxL0	= 63
AddLabel1	= EEPE
AddDA1	= 0x0E1
AddMemBit1	= 8
AddLabel2	= EEPS
AddDA2	= 0x0E1
AddMemBit2	= 8

#### **[CodeLoad]**

Transp_Read_TimeOut	= 10000
Transp_Session_TimeOut	= 50000
Transp_Session_Mode	= MULTI_PC
Transp_Buffer_Tx	= 1
Transp_Buffer_Timeout	= 10

#### **[CodeLoad-Box0]**

Name	SRAE_cdl
TranspLineNum	= 0
Protocol	= MTP
Buffer	= 128
BroadCast	= 0
Can_Filter	= 0x7F00
CmdBox	= 0x03FA
CmdPc	= 0x01FE
DataBox	= 0x03FB
DataPc	= 0x01FF
Signature	= 0x2610
Baud_Rate	= 9600
Delay	= 1
IP_Address_Location	= 0xFFFFFFFF0
Num_Addr	= 1
AddLabel0	= fujitsu
AddDA0	= 0xFE

#### **[CodeLoad-Box1]**

Name	= ACT
Protocol	= MTP
Buffer	= 128
BroadCast	= 0
Can_Filter	= 0x8000
CmdBox	= 0x0400
CmdPc	= 0x0440
DataBox	= 0x0401
DataPc	= 0x0441
Signature	= 0x2605
Baud_Rate	= 9600

```

Delay = 0
IP_Address_Location = 0x00000000
Num_Addr = 13
AddLabel0 = ACT_SRV
AddDA0 = 0xF0
AddLabel1 = ACT_SYST
AddDA1 = 0xF1
AddLabel2 = ACT_USR
AddDA2 = 0xF2
AddLabel3 = ACT_EXT
AddDA3 = 0xF3
AddLabel4 = ACT_FPGA
AddDA4 = 0xF4
AddLabel5 = ACT_CAL
AddDA5 = 0xF6
AddLabel6 = ACT_FAULT
AddDA6 = 0xF7
AddLabel7 = LOG_SRV
AddDA7 = 0xE0
AddLabel8 = LOG_KERNEL
AddDA8 = 0xE1
AddLabel9 = LOG_FSYS
AddDA9 = 0xE2
AddLabel10 = LOG_TEST
AddDA10 = 0xE6
AddLabel11 = LOG_KERNEL_A
AddDA11 = 0xEF
AddLabel12 = LOG_FSYS_A
AddDA12 = 0xEE

```

### **Example of configuration for [Graphical] section for Graphic Dashboard**

#### **[Graphical]**

```

Name = DDU01
Function = Dashboard
Dashboard_Model = DDU01
Dashboard_Num_Leds = 2
Rotation = 0
Width = 640
Height = 240
Width_Display_Satellite = 0
Height_Display_Satellite = 0
Buffer = 256
CmdBox = 0x0388
DataBox = 0x0389
CmdPc = 0x01e8
DataPc = 0x01e9
Signature = 0x060c

```

InternalCh1	= SE_1
InternalCh2	= SE_2
InternalCh3	= SE_3
InternalCh4	= SE_4
InternalCh5	= SE_5
InternalCh6	= ACC_X
InternalCh7	= ACC_Y
InternalCh8	= Beacon1
InternalCh9	= Beacon2
InternalCh10	= RawBeac1
InternalCh11	= RawBeac2
InternalCh12	= ExtBtn4
InternalCh13	= ExtBtn3
InternalCh14	= IntBtn2
InternalCh15	= IntBtn1
InternalCh16	= Lows2
InternalCh17	= Lows1
InternalCh18	= PickHall
InternalCh19	= Hall_1
InternalCh20	= Hall_2
Page0	= Reset
Page1	= Prog
Page2	= NORM 1
Page3	= NORM 2
Page4	= NORM 3
Page5	= NORM 4
Page6	= NORM 5
Page7	= NORM 6
Page8	= MECH 1
Page9	= MECH 2
Page10	= MECH 3
Page11	= MECH 4
Page12	= MECH 5
Page13	= MECH 6
Page14	= MECH 7
Page15	= MECH 8
Page16	= Msg A
Page17	= Msg lapt
Page18	= Msg B
Page19	= Msg TS9
Page20	= Alarm
Page21	= Error
Page22	= Spec 2
Page23	= Spec 3
Page24	= Spec 4
Page25	= Test 1
Page26	= Test 2
Page27	= Test 3

# Layout

SYSMA *Layouts* configurations contain screen layout prepared for the interaction with the ECU and other hardware devices. The end user, according to his preferences, can easily create different configuration files. User can open several analysis window in SYSMA, customize their graphic configuration, place them in the work area and then save the layout, that can be reloaded for later use. It is possible to switch between layouts designed for different analysis, using the *Layouts Bar* or commands dedicated to layouts management in main menu *File*. Commands for *Layouts* in main menu *File* also allow managing and organizing Layout configuration files on disk.

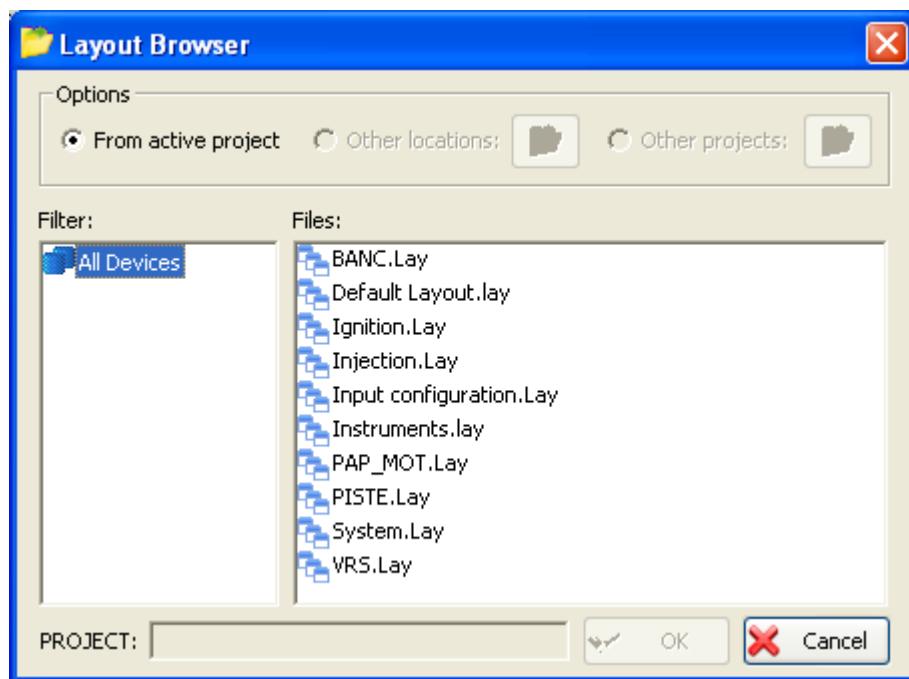
## Layout Selection

*Layout Selection* commands allow to quickly switch between layouts loaded in current project, as described in following table:

	First Layout	Selects the first layout available in the project
	Previous Layout	Selects the previous layout
	Next Layout	Selects the next layout
	Last Layout	Selects the last layout available in the project

## Load Layout

*Load Layout* command allows loading a layout file configuration from disk. Select *File / Layout Load*.



In *Layout Browser* window choose an option for searching Layout configurations: in active project directory or in other locations or search layouts saved in other projects. The *Files* list will display layout configuration files available in selected reference directory. Layout files can also be filtered by device types to which they're associated, changing selection in the *Filter* tree on the left. The *PROJECT* field in the bottom area shows the current project name.

## Create Layout

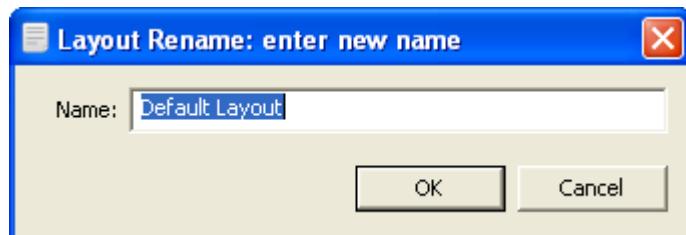
*Create Layout* command allows creating a new layout configuration file. Select *File / Create Layout*.



User can enter the file Name and choose to create the new layout starting from an empty configuration or using current displacement for SYSMA windows.

## Rename Layout

*Rename Layout* allows changing the name for current layout. Select *File / Rename Layout...* and enter a new name.



## Delete Layout

*Delete Layout* command removes current layout configuration from list of available layouts in the project. All windows belonging to the removed layout will be closed. User can also choose to delete layout configuration file from disk.

## Save Layout

*Save Layout* command saves modifications to current layout on disk, using current name for the layout.

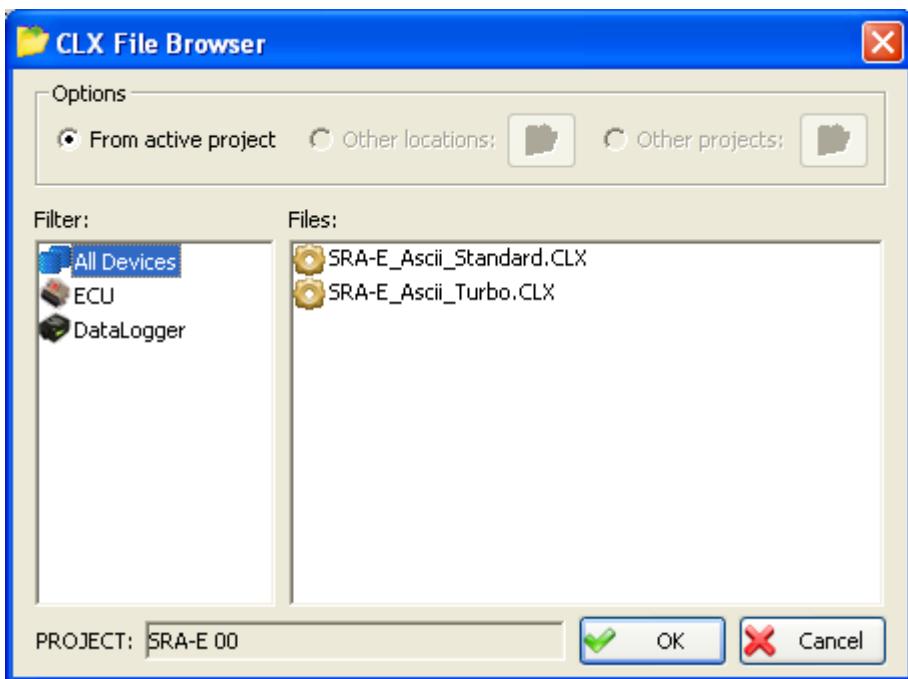
# Database

SYSMA Databases are collections of channels that can be used and configured on ECU device systems. Databases are saved in files of .CLX format that contains settings for each channel (name, physical address and so on).

Commands for managing and organizing channels databases in SYSMA are in *File* main menu. User can load database files from disk, associate them to a project and a managed device, save modifications to disk, create database copies (called Set) for performing different analysis dealing with different areas or features on the ECU.

## Browse Database

*Browse Database* command allows loading a database of channels in current project. Select *File / Browse Database (CLX)...* to open *CLX File Browser* window.



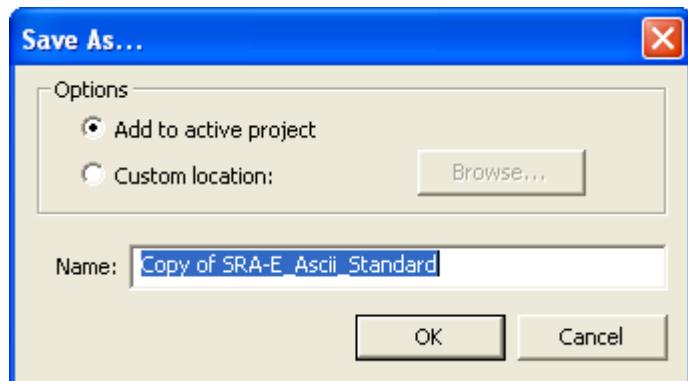
In *CLX File Browser* window choose an option for searching Database configurations: in active project directory or in other locations or search databases saved in other projects. The *Files* list will display database configuration files available in selected reference directory. Database files can also be filtered by device types to which they're associated, changing selection in the *Filter* tree on the left. The *PROJECT* field in the bottom area shows the current project name.

## Save Database

*Save Database* command saves modifications to current database on disk, using current name for the database.

## Save As Database

Save As Database command allows saving modifications to current database on disk, using a different file name for the database. Select *File / Save As Database*.



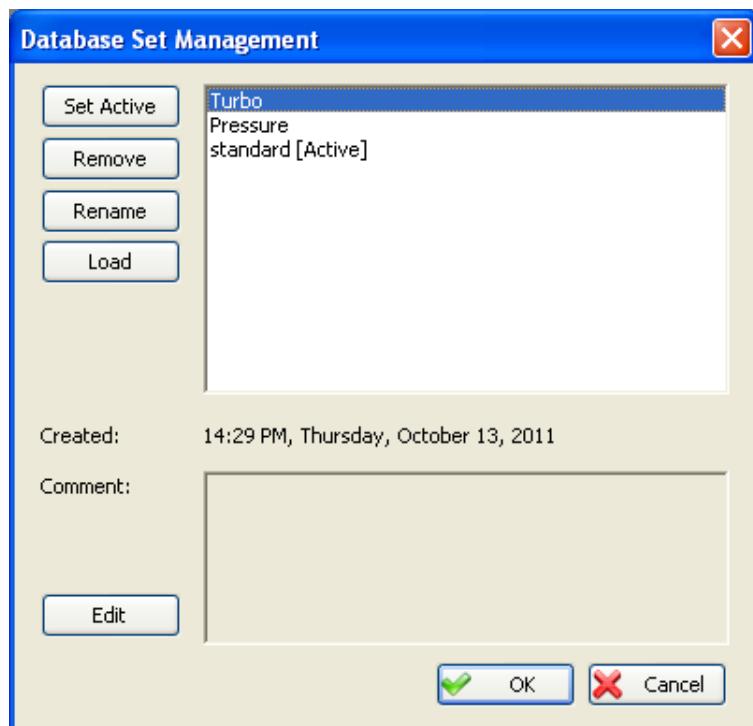
In *Options* section, choose the reference directory path where to save database: in the current active project or in a custom location. Then enter the desired *Name* for database file.

## Save all Databases

Save all Databases command saves to disk all database files loaded for current project, using their current file names.

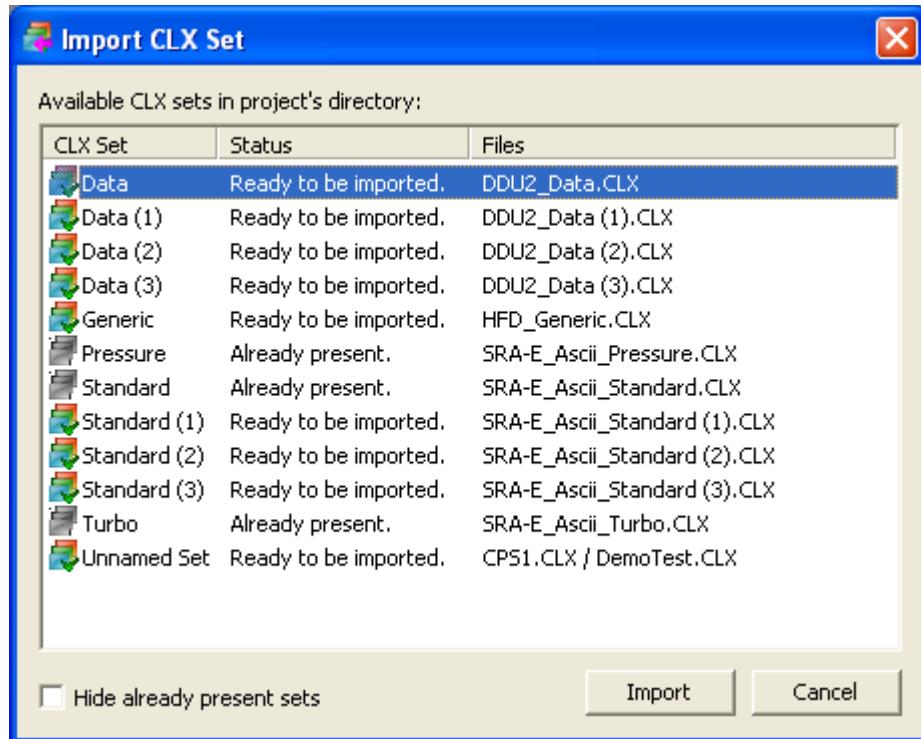
## Database Set Management

Database Set Management command allows configuring and organizing *Database Sets*. *File / Database Set Management* opens a setup window for modify configuration.



In *Database Set Management* window it's possible to change selection on active calibration set (*Set Active* button), remove or rename a database set (*Remove* and *Rename* buttons). Information about selected database set is also displayed: date of creation and comment.

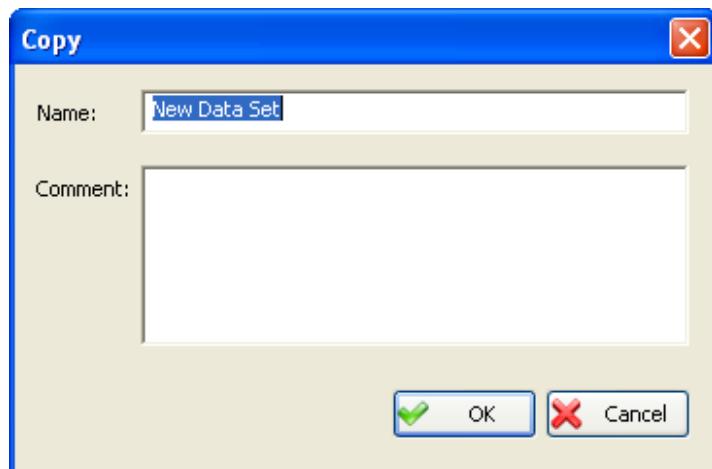
*Load* button shows a list of available database configuration files for the selected database set in *Import CLX Set* window.



User can hide items for database configurations already loaded (checking option *Hide already present sets*) and load an existing database file (button *Import*).

## Database Set Copy

*Database Set Copy* command creates a new copy of an existing database set. Simply enter a *Name* and a *Comment* for the new database set.



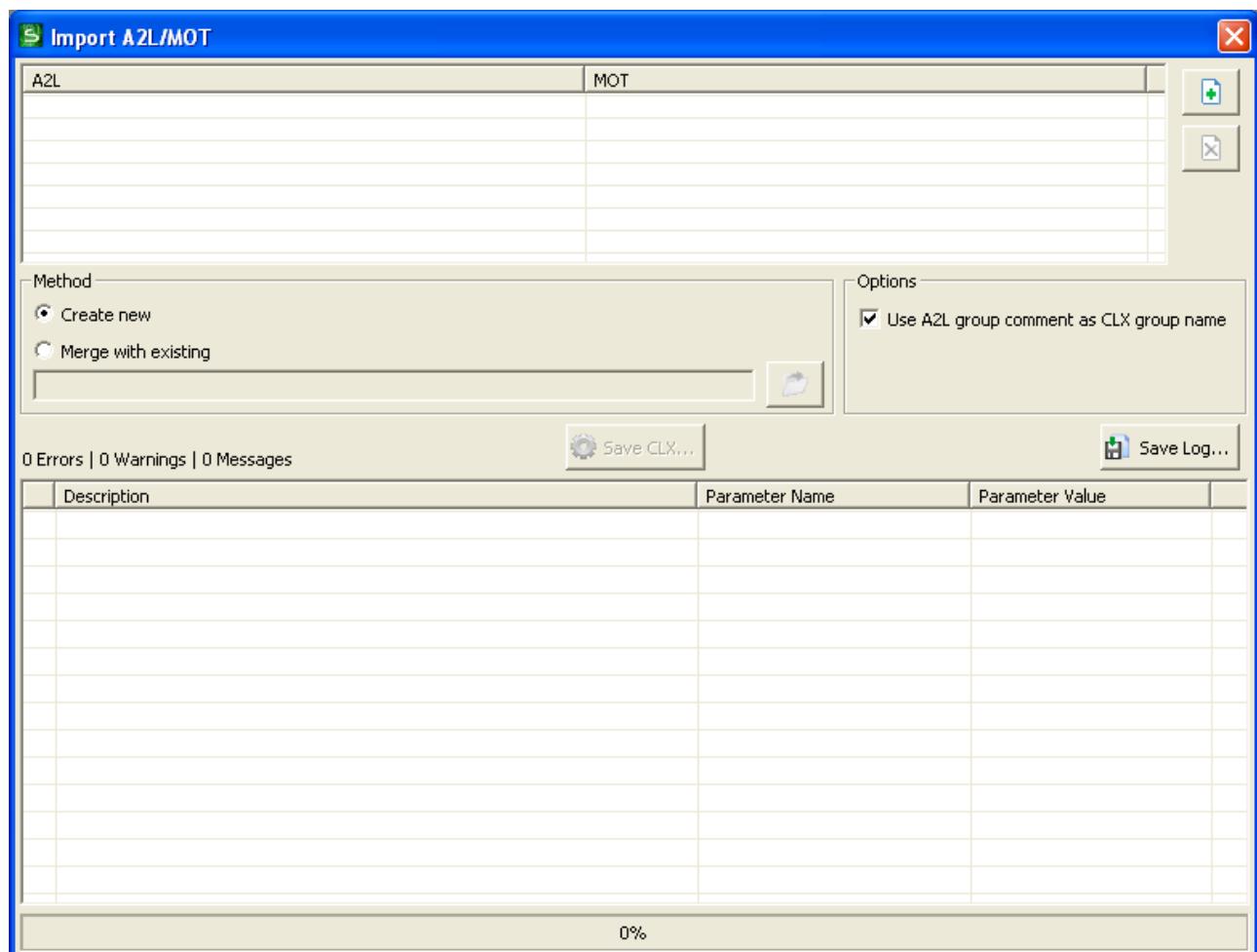
# Import

SYSMA is able to import in current project configurations and data coming from external standard formats (Asap2, Vector DBC) and formats managed by the application itself. Commands in *File / Import Data* menu allow converting definitions for channels saved in external format files and also their values in Database CLX format used by SYSMA. Command *File / Add File to Project...* allows to load in current project configurations and settings saved in files of format types used by SYSMA.

## Import Data

Import Data commands allow converting values and definitions for channels from external file formats into the Database CLX format supported by SYSMA.

### A2L/MOT



*Import A2L/MOT* command allows converting standard channel definition files (.A2L + .MOT) to Database CLX format managed by SYSMA. A2L files are standard libraries that contain descriptions of all the channels in the system, while .MOT are standard files that contain the values for channels defined in .A2L.

Channels in A2L and MOT are imported into Database CLX files used in SYSMA.

Run command *File / Import Data / Import A2L/MOT...* in the main menu to open *Import A2L/MOT* window. Add the desired number of A2L and MOT files, choose an import method, and then save target Database CLX file.

Buttons  and  add and remove items in the list of source file to be imported.

Each item in the list has an A2L file and optionally a MOT file that can be browsed with the *A2L/MOT Files* window. Select also the desired endian alignment for data values in this window (Motorola or Intel).

*Method*, two options are available for importing A2L files in SYSMA:

*Create new*, SYSMA will convert the selected A2L files to a Database file format CLX, and save it to a new file. The user will be asked for the full path name of the new file.

#### Options

*Use A2L group comment as CLX group name*: allows the user to select the A2L field that will be used as group name in CLX, group name itself or group comment.

*Merge with existing*, information converted from the selected A2L files will be appended to an existing Database file CLX. User must select a CLX file using the browse button on the right .

 *Save CLX...*: saves information converted from the A2L file to target Database CLX.

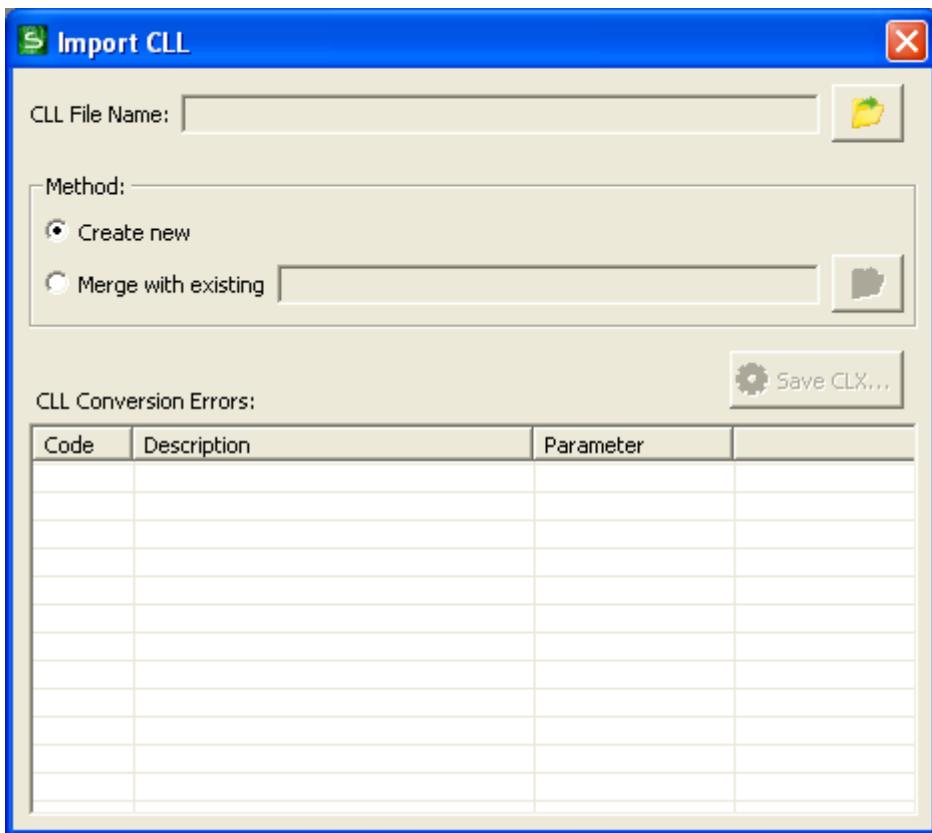
 *Save Log...*: saves to a file in text format the report for the import operation (number of errors, warnings and messages and the list of report items).

In the bottom area of the window SYSMA displays a report of import operation: aggregate statistics grouped in three categories (Errors, Warnings and Messages) and a list with details for each item (an icon that identifies the category, a short description for the event and the name of the channel).

Icon	Event	Description
	<b>Errors</b>	critical incompatibility between A2L and Database CLX formats: channel won't be imported.
	<b>Warnings</b>	there are differences between A2L and Database CLX formats; channel will be imported anyway, also if some errors may occur using the channel in SYSMA.
	<b>Messages</b>	there are differences between A2L and Database CLX formats; channel will be imported anyway, because differences won't affect the usage of the channel in SYSMA.

A graphic bar below the report area will help to check the progress status for the import operation showing the current percentage.

## CLL Channels List Library



*Import CLL* command allows converting Channels List Library files (.CLL) to Database CLX format managed by SYSMA. CLL files are libraries that contain descriptions (name and physical address) of all the channels in the system, used in the tools *Vision5* and *Axon*.

Run command *File / Import Data / Import CLL...* in the main menu to open *Import CLL* window. Select a CLL file and an import method then save the result to a Database CLX file.

**CLL File Name:** the full path for system CLL file. The file can be selected using a standard browse window that opens with the button on the right side .

**Method:** two options are available for importing CLL files in SYSMA:

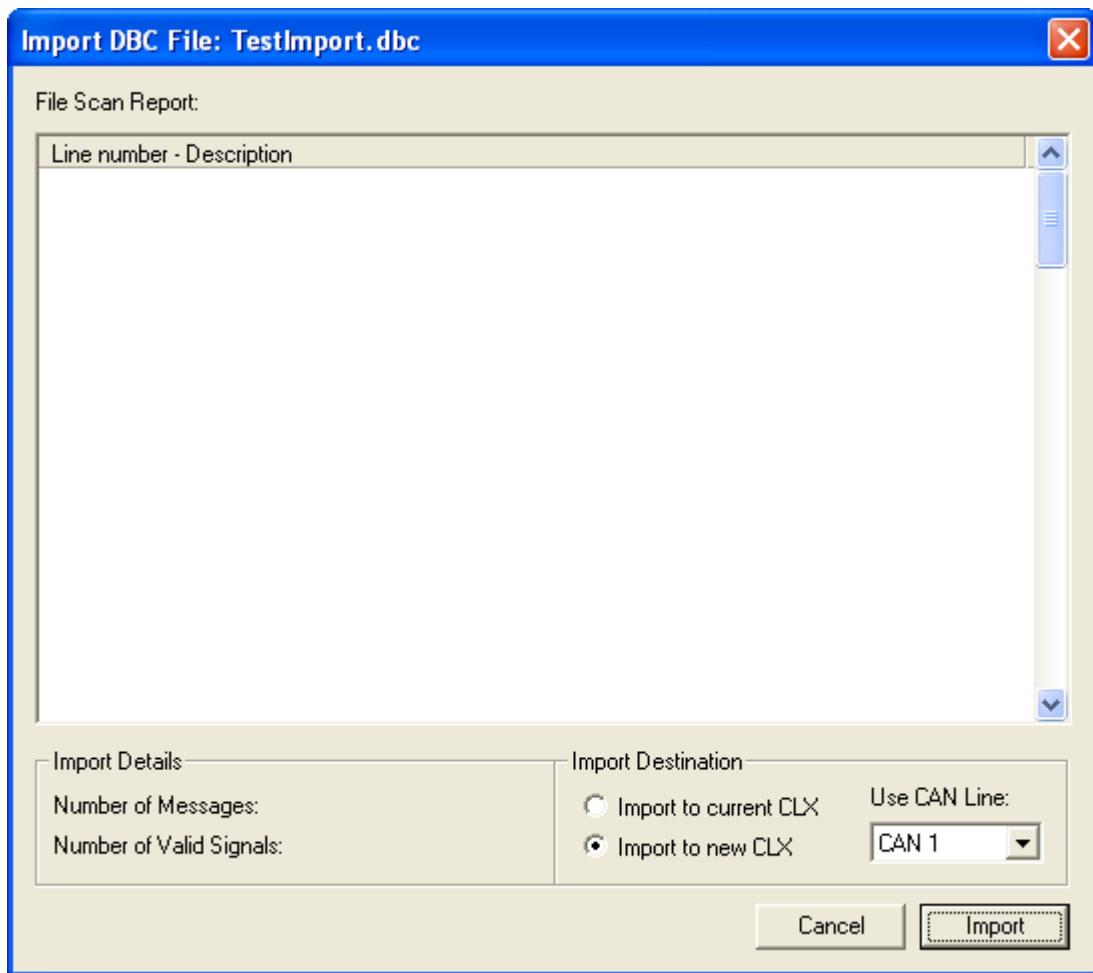
**Create new** will convert the selected CLL file to a Database file format CLX, and save it to a new file. The user will be asked for the full path name of the new file.

**Merge with existing**, information converted from the selected CLL file will be appended to an existing Database file CLX. User must select a CLX file using the browse button on the right .

 **Save CLX...:** saves information converted from the CLL file to target Database CLX, writing settings on disk.

**CLL Conversion Errors:** displays a list of possible errors occurred in import operation. For each error the name of the parameter/channel affected by error together with a short description and an identification code of the error are shown. If no error occurs the list will be empty.

## DBC



DBC files contain settings for configuring CAN line geometry for variable channels, in a standard format developed by Vector. These settings can be converted into Database format used in SYSMA, and saved in CLX files.

Run command *File / Import Data / Import DBC...* from main menu and select a DBC file to import. In the *Import DBC File* window SYSMA will show a list of import details, grouped in three Log Levels of incompatibility, and other summary statistics (Number of Messages, Number of Valid Signals).

Icon	Event	Description
	<b>Errors</b>	critical incompatibility between DBC and Database CLX formats: channel won't be imported.
	<b>Warnings</b>	there are differences between DBC and Database CLX formats; channel will be imported anyway, also if some errors may occur using the channel in SYSMA.
	<b>Messages</b>	there are differences between DBC and Database CLX formats; channel will be imported anyway, because differences won't affect the usage of the channel in SYSMA.

Select an *Import Destination* mode in the window

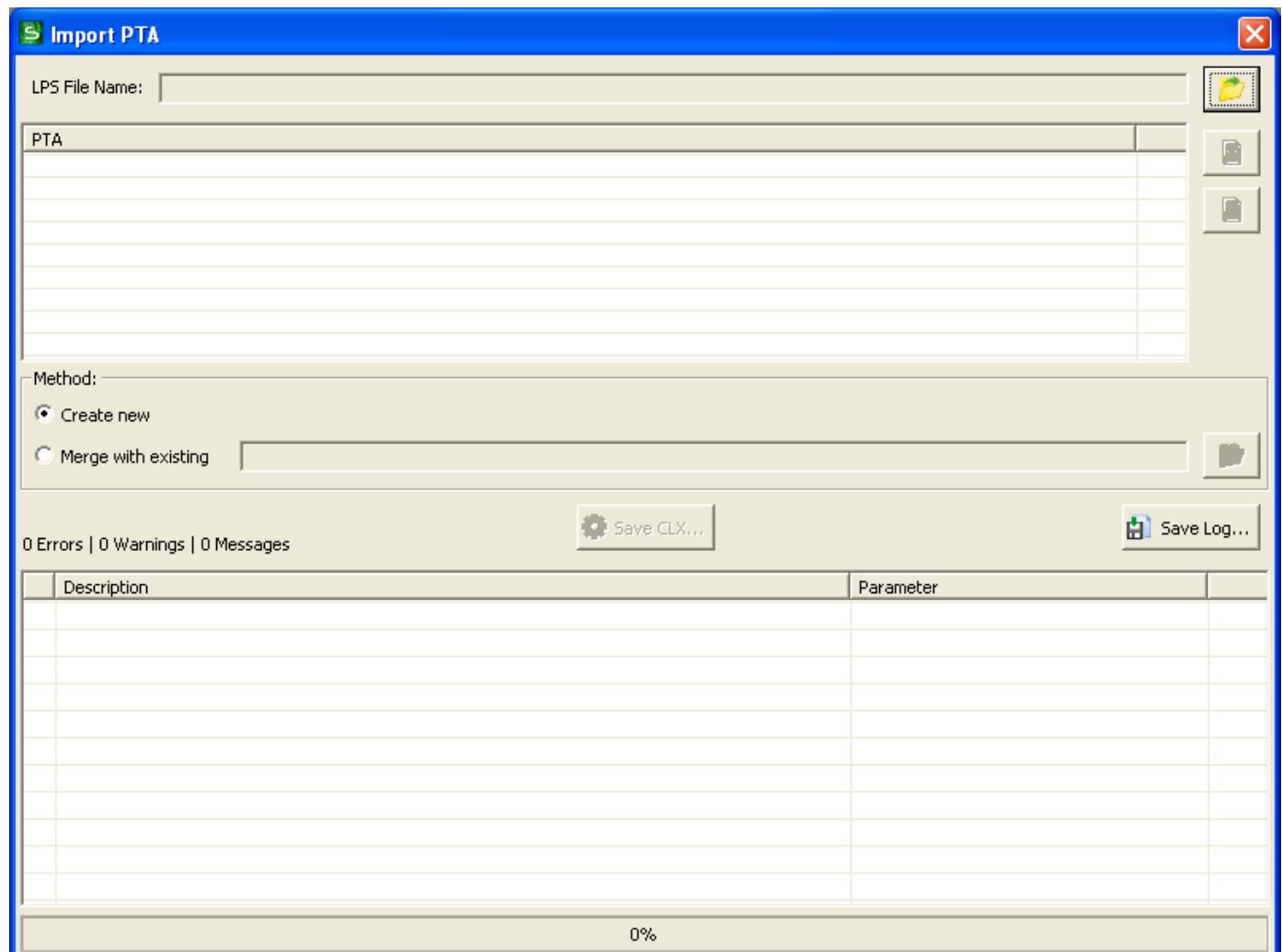
- *Import to current CLX* will add converted information to current Database CLX configuration loaded. This option is available only if a CLX is loaded in the SYSMA Database window.
- *Import to new CLX* will open the SYSMA Database window with a new CLX configuration that has the same name as the DBC file imported.

Also select a CAN line in the *Use CAN Line* combo box.

When ready, press *Import* button to complete import operation.

Use SYSMA commands in menu *File* to save the CLX modified or the new CLX to disk (*Save Database*, *Save As Database...*).

## PTA



*Import PTA* command allows converting calibration table settings and values from PTA file format to Database CLX format.

PTA files contain settings and data values for calibration tables (MAPs), used in the tool Vision5.

Run command *File / Import Data / Import PTA...* in the main menu to open *Import PTA* window.

Select a system description file LPS (this system description file format, used for the tool Vision5, is necessary to interpret settings for calibration map files in PTA format).

Select the desired PTA files to be imported. Note that each PTA file must be compliant with selected LPS file.

Select an import method then save the result to a Database CLX file.

*LPS File Name:* the full path for system LPS file. The file can be selected using a standard browse window that opens with the button on the right side .

*PTA list:* list of PTA files to be imported. List can be modified adding and removing items with buttons  and  on the right.

*Method*, two options are available for importing PTA files in SYSMA:

*Create new* will convert the selected PTA files to a Database file format CLX, and save them to a new file. The user will be asked for the full path name of the new file.

*Merge with existing*, information converted from the selected PTA files will be appended to an existing Database file CLX. User must select a CLX file using the browse button on the right .

 *Save CLX...:* saves information converted from the PTA files to target Database CLX, writing settings and values (data) on disk.

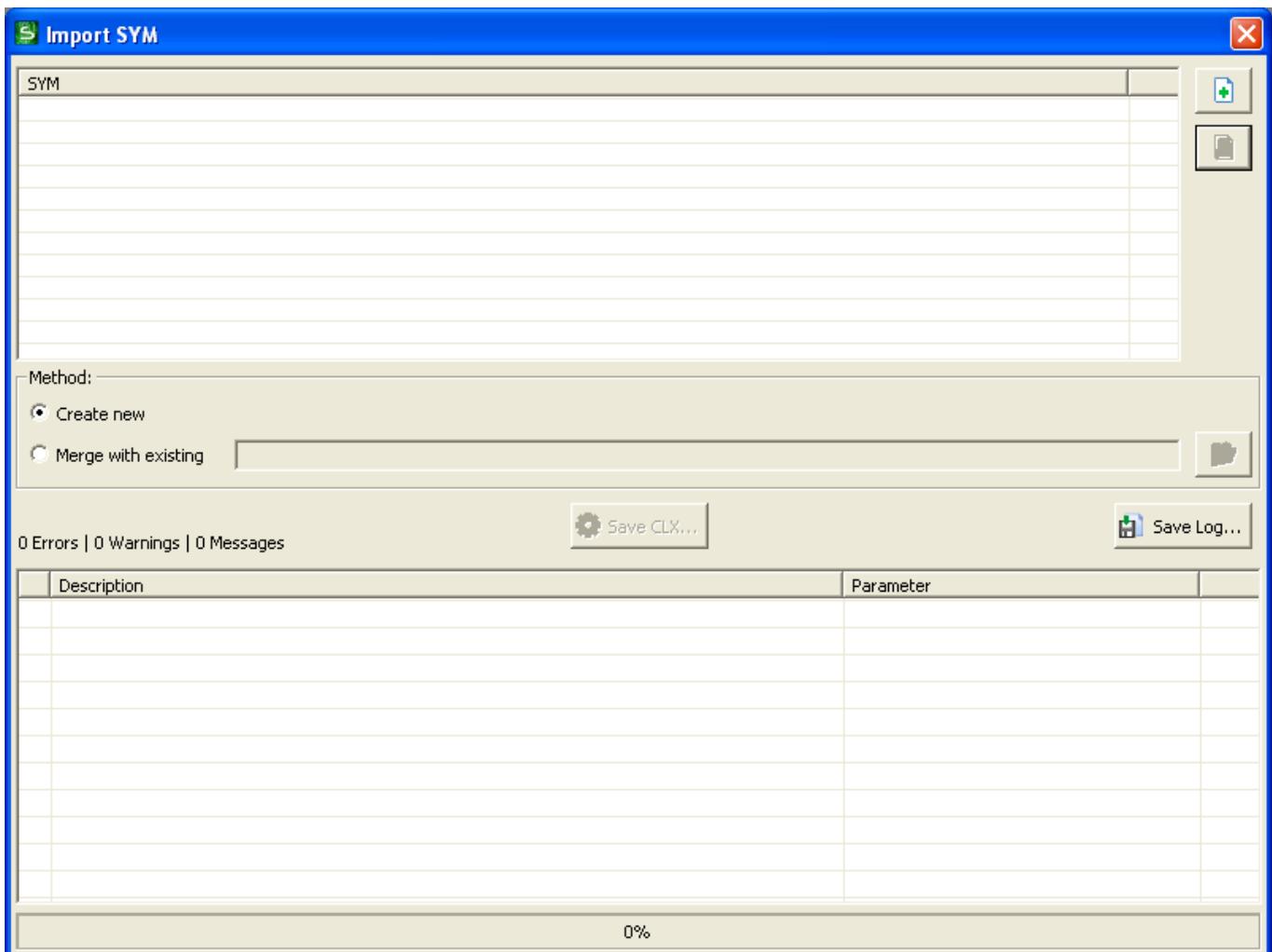
 *Save Log...:* saves to a file in text format the report for the import operation (number of errors, warnings and messages and the list of report items).

In the bottom area of the window SYSMA displays a report of import operation: aggregate statistics grouped in three categories (Errors, Warnings and Messages) and a list with details for each item (an icon that identifies the category, a short description for the event and the name of the calibration channel).

Icon	Event	Description
	<b>Errors</b>	critical incompatibility between PTA and Database CLX formats: calibration won't be imported.
	<b>Warnings</b>	there are differences between PTA and Database CLX formats; calibration will be imported anyway, also if some errors may occur using the calibration in SYSMA.
	<b>Messages</b>	there are differences between PTA and Database CLX formats; calibration will be imported anyway, because differences won't affect the usage of the calibration in SYSMA.

A graphic bar below the report area will help to check the progress status for the import operation showing the current percentage.

## SYM



*Import SYM* command allows to convert settings for symbolic in SYM format to Database CLX format.

SYM files contain configuration used in the tool Vision5 to locate a variable in memory areas of a device by address, data type and name.

Run command *File / Import Data / Import SYM...* in the main menu to open *Import SYM* window.

Select the desired SYM files to be imported.

Select an import method then save the result to a Database CLX file.

In SYSMA, Database CLX files loaded as Symbolic are used in *Read Write* analysis windows, mainly for debugging purpose.

*SYM list:* list of SYM files to be imported. List can be modified adding and removing items with buttons and on the right.

*Method,* two options are available for importing SYM files in SYSMA:

*Create new* will convert the selected SYM files to a Database file format CLX, and save them to a new file. The user will be asked for the full path name of the new file.

*Merge with existing*, information converted from the selected SYM files will be appended to an existing Database file CLX. User must select a CLX file using the browse button on the right .

 **Save CLX...**: saves information converted from the SYM files to target Database CLX, writing settings and values (data) on disk.

 **Save Log...**: saves to a file in text format the report for the import operation (number of errors, warnings and messages and the list of report items).

In the bottom area of the window SYSMA displays a report of import operation: aggregate statistics grouped in three categories (Errors, Warnings and Messages) and a list with details for each item (an icon that identifies the category, a short description for the event and the name of the calibration channel).

Icon	Event	Description
	<b>Errors</b>	critical incompatibility between SYM and Database CLX formats: symbolic won't be imported.
	<b>Warnings</b>	there are differences between SYM and Database CLX formats; symbolic will be imported anyway, also if some errors may occur using the symbolic in SYSMA.
	<b>Messages</b>	there are differences between SYM and Database CLX formats; symbolic will be imported anyway, because differences won't affect the usage of the symbolic in SYSMA.

A graphic bar below the report area will help to check the progress status for the import operation showing the current percentage.

## CFG and CFZ

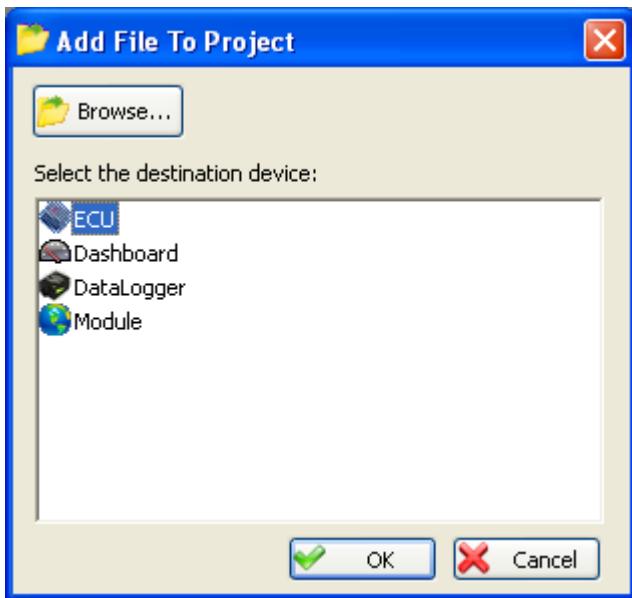
Import CFG and CFZ commands convert configuration file formats used by the tool Vision5 into SYSMA project configuration. Basically, settings dealing with the layout of instrument and analysis windows are imported: position and graphical aspect for the windows in the workspace area of SYSMA.

.CFZ format differs from .CFG in the fact that is a binary file format that can also be compressed.

No interface windows are needed for running the commands. Simply select *File / Import Data / Import CFG...* or *Import CFZ...* from main menu to browse source files; warning messages will show the result of import operation.

## Add File to Project

Command *File / Add File to Project...* allows to load in current project configurations and settings saved in files of format types used by SYSMA.



In Add *File To Project* window, browse for the desired files to import using *Browse...* button.

Then select a device in the list *Select the destination device*. If the file is compliant to SYSMA, its configuration will be loaded in the node of the selected device.

## Print

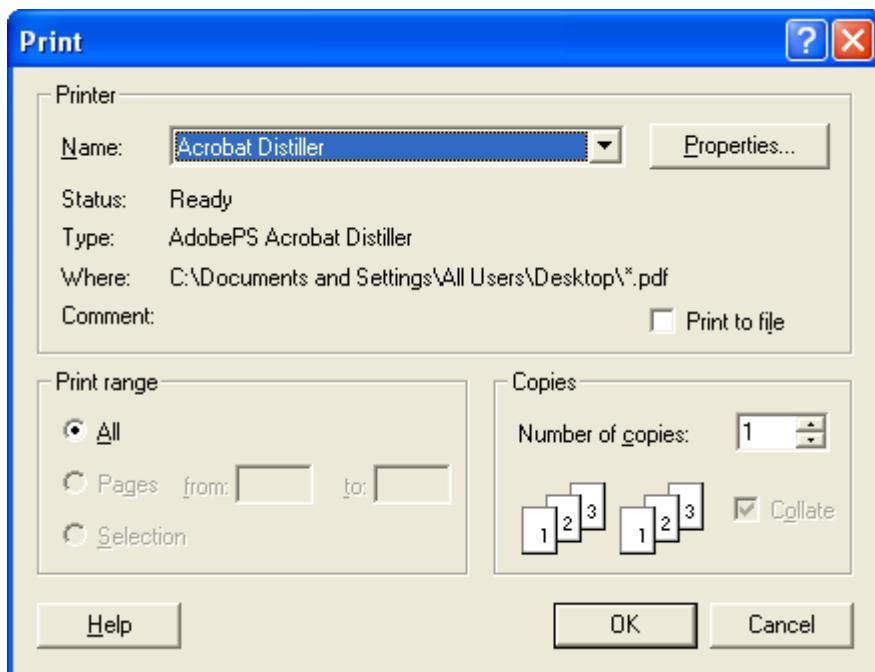
Standard Windows printing features can be found in SYSMA under *File* main menu.

There are two different commands, dedicated to *ECU* environment and *DataLogger - Dashboard* environments.

### Print Setup

*Print Setup* command in *File* main menu is used for prepare print settings in ECU Calibration 3D window.

The command opens a standard Windows window, where user can select desired print device and modify print configuration and behavior.



## Print Window

*Print Window* command in *File* main menu is used for printing analysis window of *DataLogger* and *Dashboard* environments.

The command opens a standard Windows window, where user can select desired print device and modify print configuration and behavior.

# Channel Browser

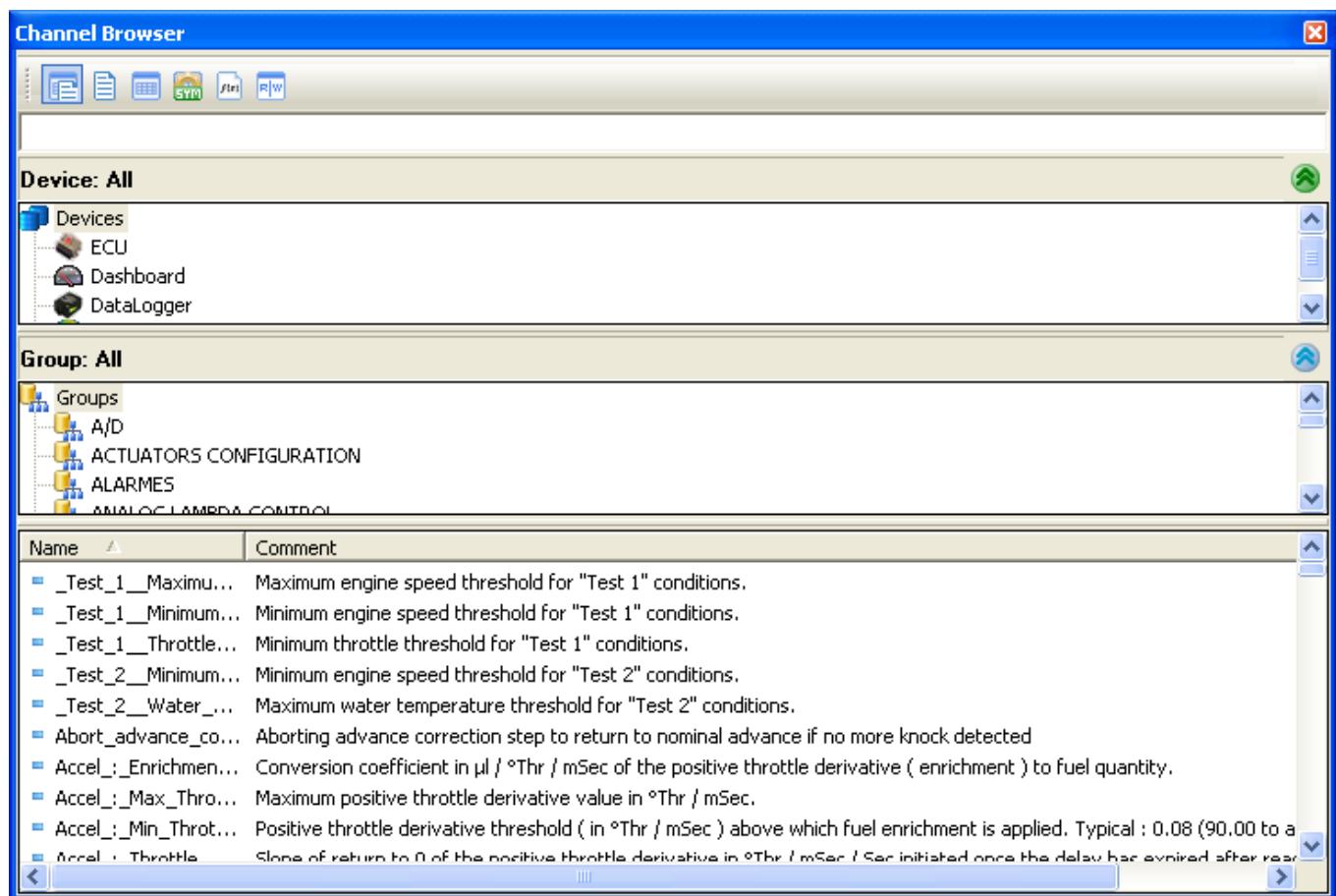
*Channel Browser* environment helps managing channels defined in all database files (CLX) and virtual channels libraries files (VCH) loaded in current project.

The window displays the channels list (Name and Comment for each channel), allowing searching and filtering operations by channel type, device type and groups.

Channels in this window can also be configured in analysis windows by drag and drop.

*Channel Browser* is an advanced toolbar window that can be displayed either docked on left or right side of SYSMA main window area, or in floating mode. Use command *View / Channel Browser* or button icon on *Project* toolbar to show or hide the window.

The window is made up by several areas: in header area there are an embedded toolbar for filtering channels type, an edit for search names by string, a Device and Group filtering trees; below is the channels list.



## Toolbar filter

Toolbar in the top header zone of the window contains buttons for filtering channels list by channel type, identified with icons:

- All channel types (Measurements and Calibrations and others),
- Measurements,
- Calibration Tables,
- SYM Calibration Tables,
- Virtual Channels,
- Read Write Channels.

Selecting with mouse a button icon in this toolbar will filter the channel list.

## Search by channel name

User can search for channels by name, typing strings in the edit field below the toolbar filter. The channel list will be updated as the string filter changes.

## Devices filter

In the Device filter area, devices configured for current project are displayed in a tree. Select a node in the tree to filter channel list by the correspondent device type.

The name of the selected device type is shown in the caption of this area.

Use the button on the right side to show or hide this area.

## Groups filter

In the Groups filtering area, all Groups defined in all database files loaded in the current project are displayed in a tree. Select a node in the tree to filter channel list by the correspondent Group.

The name of the current selected Group is shown in the caption of this area.

Depending on selected channels type (Calibration channels), also commands for reading and writing channels values from and to ECU are available via popup menu that opens with right mouse button on items in this area.

Use the button on the right side to show or hide this area.

## Channels list

Channels list displays in columns Name and Comment all the available channels defined in all database files loaded in current project.

Columns Name or Comment can sort the list, by clicking with mouse on column header fields.

The list also reflect filter settings selected in Toolbar filter, Search by channel name edit, Device filter and Groups filter areas.

Depending on selected channels type (Calibration channels), also commands for reading and writing channels values from and to ECU are available via popup menu that opens with right mouse button on items in this area.

User can drag and drop channels from this area to analysis windows. Cursor shape will show if selected channels can be configured on the analysis window while dragging. To open Calibration channel in ECU Calibration Table window, simply double click on channel.

An icon on the left of each item shows channel type for the item, following the scheme below.

Icon	Channel Type	Description
	All	channels for all types are displayed
	Measurements	dynamically updated variables, usually displayed in Instrument or Oscilloscope windows
	Calibration Tables	Calibration Table channels used in ECU Table windows as parameters and variables (scalars, vectors and tables)
	SYM Calibration Tables	special Calibration Table channels used only in Read Write window (scalars, vectors and tables)
	Virtual Channels	channels defined in Virtual Channels libraries
	Read Write Channels	channels configured in Read Write window

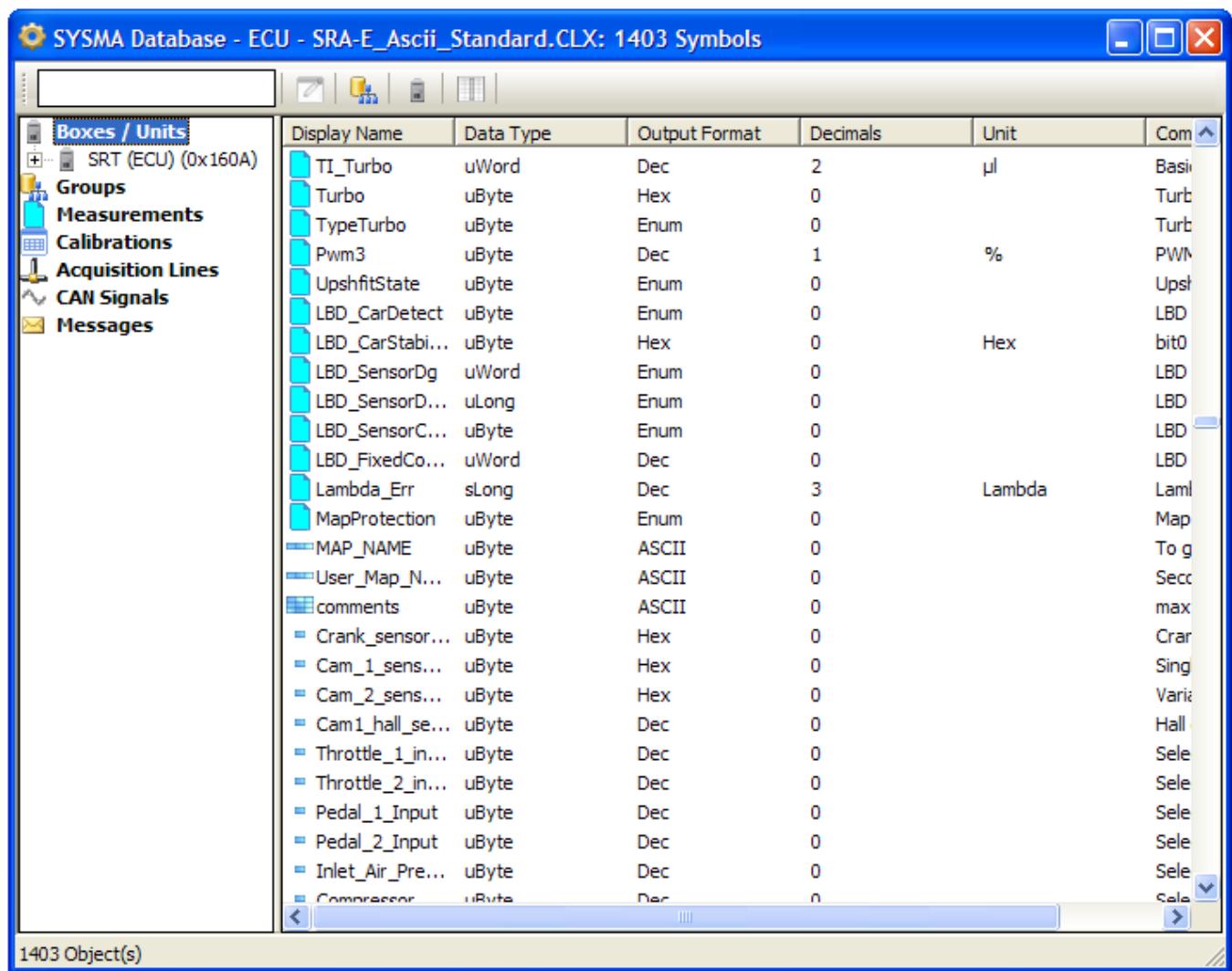
# CLX Editor

CLX Editor environment helps managing channels defined in all database files (CLX).

The window displays the channels list, allowing searching and filtering operations by boxes, groups, measurement, calibrations, acquisition lines, CAN signals, messages.

In project workspace toolbar, use double click to show the CLX editor window.

The window is made up by several areas: in header area there are an embedded toolbar for search names by string, edit channel properties , edit groups , edit boxes/units , selecting current visible columns .



Screenshot of the CLX Editor window titled "SYSMA Database - ECU - SRA-E\_Ascii\_Standard.CTX: 1403 Symbols". The window features a tree filter on the left and a main table on the right.

**Tree Filter (Left):**

- Boxes / Units
  - SRT (ECU) (0x160A)
- Groups
- Measurements
- Calibrations
- Acquisition Lines
- CAN Signals
- Messages

**Main Table (Right):**

Display Name	Data Type	Output Format	Decimals	Unit	Com
TI_Turbo	uWord	Dec	2	µl	Basi
Turbo	uByte	Hex	0		Turb
TypeTurbo	uByte	Enum	0		Turb
Pwm3	uByte	Dec	1	%	PWM
UpshftState	uByte	Enum	0		Upst
LBD_CarDetect	uByte	Enum	0		LBD
LBD_CarStabi...	uByte	Hex	0		bit0
LBD_SensorDg	uWord	Enum	0		LBD
LBD_SensorD...	uLong	Enum	0		LBD
LBD_SensorC...	uByte	Enum	0		LBD
LBD_FixedCo...	uWord	Dec	0		LBD
Lambda_Err	sLong	Dec	3		Lambd
MapProtection	uByte	Enum	0		Map
MAP_NAME	uByte	ASCII	0		To g
User_Map_N...	uByte	ASCII	0		Secc
comments	uByte	ASCII	0		max
Crank_sensor...	uByte	Hex	0		Crar
Cam_1_sens...	uByte	Hex	0		Sing
Cam_2_sens...	uByte	Hex	0		Varia
Cam1_hall_se...	uByte	Dec	0		Hall
Throttle_1_in...	uByte	Dec	0		Sele
Throttle_2_in...	uByte	Dec	0		Sele
Pedal_1_Input	uByte	Dec	0		Sele
Pedal_2_Input	uByte	Dec	0		Sele
Inlet_Air_Pre...	uByte	Dec	0		Sele
Compressor	uByte	Dec	0		Sele

## Tree filter

Tree in the left zone of the window contains items for filtering channels list by channel type, identified with icons:

1. Boxes/Units,
2. Groups,
3. Measurements,
4. Calibrations,
5. Acquisition Lines,
6. CAN Signals,
7. Messages.

Selecting with mouse a button icon in this tree will filter the channel list.

## Search by channel display name

User can search for channels by display name, typing strings in the edit field below the toolbar filter. The channel list will be updated as the string filter changes.

## Channels list

Channels list displays in columns visible all the available channels defined in all database files loaded in current project.

Columns visible can sort the list, by clicking with mouse on column header fields.

The list also reflect filter settings selected in tree filter, search by channel name edit.

On selected channels, the commands for editing properties are available via popup menu that opens with right mouse button on items in this area.

Depending on selected channels type (calibration channels), also commands for reading and writing channels values from and to ECU are available via popup menu that opens with right mouse button on items in this area.

User can drag and drop channels from this area to analysis windows. Cursor shape will show if selected channels can be configured on the analysis window while dragging. To open Calibration channel in ECU Calibration Table window, simply double click on channel.

An icon on the left of each item shows channel type for the item, following the scheme below.

Icon	Channel Type	Description
	Measurements	dynamically updated variables, usually displayed in Instrument or Oscilloscope windows
	Calibration Tables	Calibration Table channels used in ECU Table windows as parameters and variables (scalars, vectors and tables)
	SYM Calibration Tables	special Calibration Table channels used only in Read Write window (scalars, vectors and tables)

# Connection Status

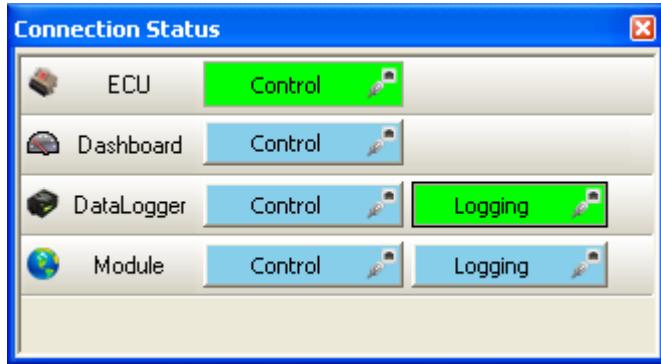
*Connection Status* window is a special toolbar window that can either be docked or placed in floating mode in the SYSMA workspace area. Select *View / Connection Status* command in main menu to show or hide the window.

The purpose of this toolbar is to provide a compact list of all the connections available in the active project. For each device present in the project can be displayed two buttons: one for the “Control” connection and one for the “Logging” connection. Each button’s icon represents the communication line set for those type of connection (Ethernet  or CAN ).

- **Control** connection allows to manage Calibrations (sending and receiving Calibrations from the device), Read and Write values for parameters in specific memory areas of the device, and other functions usually available on devices used to handle engine control units.
- **Logging** connection allows programming the device with Logging Channels table, managing logging features as Trigger conditions and Zeros, read actual values for logging channels, and other functions usually available on devices used to handle acquisition for telemetry data.

Use *Connection Status* window to check and manage connections with devices configured in current active project.

The availability of the connection type (*Control* and *Logging*) for each device depends on the file system Device Description file (.DEV), which is loaded into the project and associated with the device itself.



The window displays names of devices configured in active project together with icons that show their types. For each device, buttons *Control* and *Logging* visualize current connection status and type.

**Green colour** for these button means that communication with device is ON and device connection is correct.

**Red colour** means that SYSMA is trying to connect to device, but there are some errors in communication so connection is OFF.

Otherwise communication is not running and SYSMA is not trying to connect to device (neutral/idle status). Use *Control* and *Logging* buttons to start or stop communication with devices.

# Log Window

*Log Window* window is a special toolbar window that can either be docked or placed in floating mode in the SYSMA workspace area. Select *View / Log Window* command in main menu to show or hide the window.

Time	Message
16:52.37	Loading the project : C:\SYSMA\1\Projects\SRA-E 00\SRA-E 00.prj
16:52.37	Loading SRAE _All.DEV. Box master_box: missing one or more of CmdPc, DataPc, CmdBox, DataBox for PC1. Box master_box will not be connected.
16:52.37	Loading SRAE _All.DEV. Box rear_box: missing one or more of CmdPc, DataPc, CmdBox, DataBox for PC1. Box rear_box will not be connected.
16:52.37	Loading SRAE _All.DEV. Box front_box: missing one or more of CmdPc, DataPc, CmdBox, DataBox for PC1. Box front_box will not be connected.
16:52.38	"MapPar00": Box-Unit "==" doesn't exist
16:52.38	Mapping: invalid entry n. 0
16:52.59	Connecting to 'SRT' on Control (Eth)
16:53.00	Starting connection (Tx:CR) at BOX: SRT
16:53.00	MTP: Connect Request to 'SRT' is OK.
16:53.00	Team client license: 18
16:53.00	File name: SRAE_LITE_GENERIC.4.49
16:53.00	Read Release Info: OK
16:53.00	SRT->SH7058: Read Static Table OK
16:53.00	SRT->SH7058: Reset Dynamic Table OK
16:53.00	Dynamic table - Insert channel: ReadWriteChn000
16:53.00	SRT->SH7058: Write Dynamic Table OK
16:53.00	End of Complete Protocol at BOX 'SRT'
16:53.15	MTP: Disconnect Request to 'SRT' OK.
16:53.15	Box 'SRT' is disconnected

Log Window allows more detailed monitoring on SYSMA operating work session, listing messages in two columns:

- *Time*, for a time stamp of the event, with an icon to show warning level for the item;
- *Message*, with a description of the event.

Be careful that this window slows down the communication protocol with devices, so it should only be used for debugging purposes.

# View Windows

Several analysis windows are available in SYSMA for monitoring the current operating of ECU devices, examining memory areas, displaying current values for channel variables configured on ECU or update to ECU values for parameters.

Analysis windows can be opened from *View* main menu.

1. **Instrument Window**
2. **Oscilloscope Window**
3. **Read Write Window**
4. **Alarms Report Window**
5. **Diagnostic Report Window**
6. **Data Logger Channels Window**
7. **ECU Channels Window**

## Instrument Window

The Instrument window allows a flexible layout configuration; two main kinds of channel representations are available:

**Display mode:** the channel is accessible in a read-only way.

**Potentiometer mode:** the channel is accessible in a read & write way (user value is transmitted to the ECU and written to the target location, if the access rights checked by the ECU are met).

A SYSMA Instrument window will contain channels represented as display or potentiometer, according to the user preferences.

In addition to the text representation, the channel in SYSMA can be displayed in a graphical format; bar graphs, gauges, selectors, etc. can be included in the layout for a user-friendly interface.

SYSMA allows creating windows with various objects inside the same window:

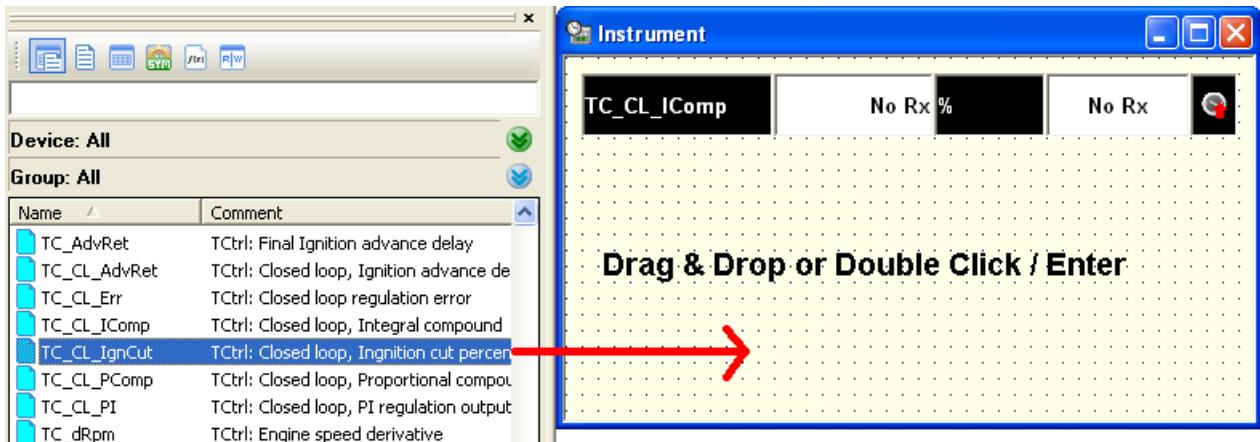
This could be the representation of the new Instrument window. It will be possible to insert various objects (*Gauge*, *Selectors*, *Alphanumeric*, *Potentiometer*, etc.) inside a single window. Every single channel will be customized from the user as colours, font, dimensions and positions, to make the most flexible the use of the application.

In order to customize an object you can double click on it or use the context menu (DX click) and select "Modify Instrument".

### Manage instrument window's channels

To add new channels to an instrument window you must open the channel browser toolbar using the menu "View/Channel Browser" or the specific button in the project main toolbar .

From the channel browser you can add new channels using drag & drop or by double clicking on it / press Enter (they will be added to the focused instrument window).



The channels will be added of the selected default type (Selector, Alphanumeric, Gauge...).

The default adding type can be selected by:

1. using the menu "Edit/Default Instrument Type"
2. with the specific toolbar "*Instruments Editor*":

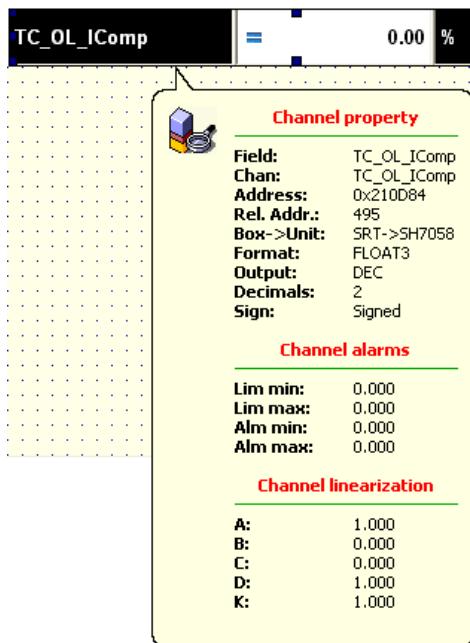


1. The context menu on the instrument window.

You can also change the instrument type of the already added channels by using the context menu or by editing the channels properties.

## Channel Property

To display detailed information on the channel, right hand mouse button and select *Property*.



**Make Same Style** command is also available: when at least two instruments are selected, it copies setup style (Colours and Fonts) of first channel selected to all other channels selected (see *Edit/Size And Position* menu).

## Instruments Sizing and Alignment

The commands are referred to two or more instruments in the same window. To select more than one channel keep pressed the Ctrl key. Commands refer to the dominant channel.

SYSMA allows the user to use these commands by:

2. Right click on selected items and select "Size and Position";
3. Select the command from the *Size and Position* toolbar;
4. From the menu "*Edit/Size and Position*".



	<b>ALIGN TOP</b>	Align the top edges of the selected instrument with the domination instrument
	<b>ALIGN BOTTOM</b>	Align the bottom edges of the selected instrument with the domination instrument
	<b>ALIGN LEFT</b>	Align the left edges of the selected instrument with the domination instrument
	<b>ALIGN RIGHT</b>	Align the right edges of the selected instrument with the domination instrument
	<b>SPACE ACROSS</b>	Set to zero the horizontal spaces between the selected instruments

	<b>SPACE DOWN</b>	Set to zero the vertical spaces between the selected instruments
	<b>ALIGN DIVIDER</b>	Align the selected instrument dividers with the dominant instrument
	<b>MAKE SAME WIDTH</b>	Resized the selected instrument to have the same width as the dominant instrument
	<b>MAKE SAME HEIGHT</b>	Resized the selected instrument to have the same height as the dominant instrument
	<b>MAKE SAME SIZE</b>	Resized the selected instrument to have the same size as the dominant instrument

## Channel Instruments

Channel Instruments can be made up by items in text format and graphical items. Textual items can be integrated inside the graphical area, or displayed independently. Configurations and settings available for each instrument depend upon the type of instrument.

### Alphanumeric



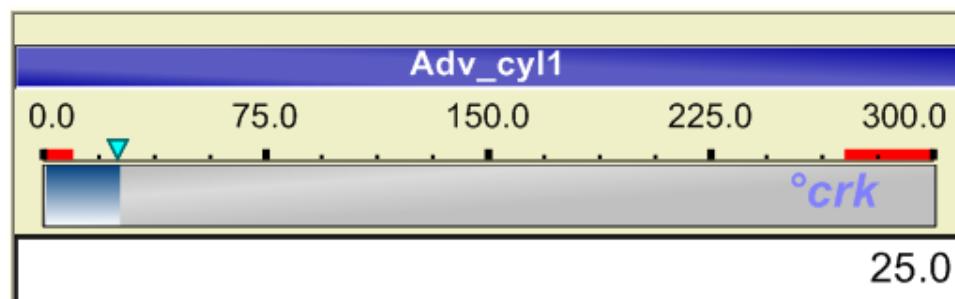
Alphanumeric instrument displays channel Name, current channel Value and channel Unit measure in text format. If an alarm range is configured for this instrument, the text colour in Value field changes with respect to the alarm condition.

### Alphanumeric Alarm



Alphanumeric Alarm instrument is quite like Alphanumeric one (textual items Name, Value and Unit), with the addition of a further field (Alarm) that graphically displays the state of Alarm condition and Out of Range condition configured for the instrument, using two icons led. The two LEDs changes colour with respect to the Alarm and Out of Range conditions, and can be optionally be visualized or not.

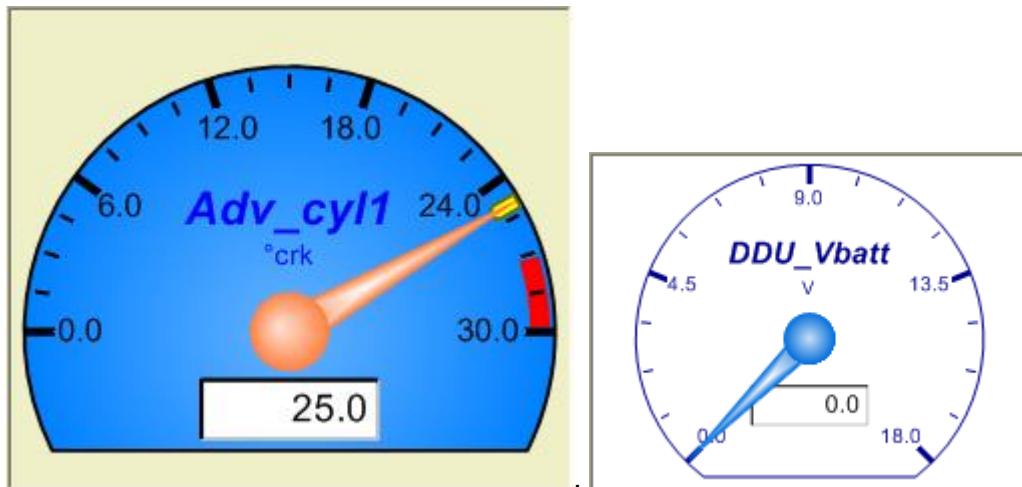
### BarGraph



BarGraph instrument is made up by items in text format (Name, Value and Unit) and a graph item. The graph item displays the current value of the channel on a graduated bar. To properly display the tool is necessary to set a range of valid values for the scale. On the BarGraph also coloured stripes for Alarm and Out of Range conditions, and graphic arrows for historical Minimum and Maximum values can be displayed. User can choose the layout for the instrument, with text items integrated inside the same area with the BarGraph, and the type of the BarGraph shape.

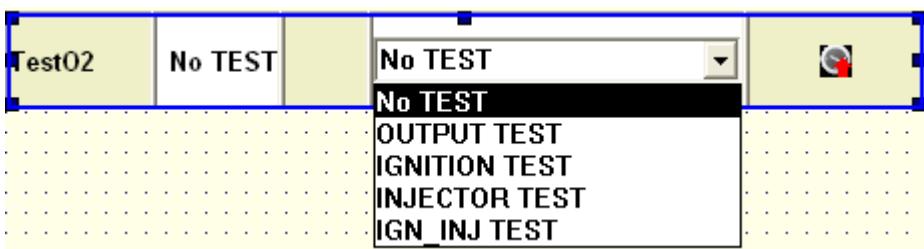
User can change numeric precision representation using a scale factor that will be displayed near to unit measure.

## Gauge



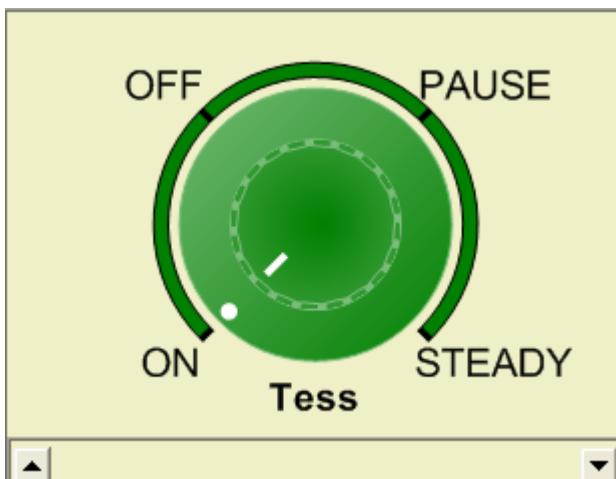
Gauge instrument is made up by items in text format (Name, Value and Unit) and a graph item. The graph item uses a tachometer graphic layout to show channel value, Alarm and Out of Range conditions, Minimum and Maximum values. As for BarGraph instrument, textual items can be integrated inside the area of the graph or not, and user can choose different layout settings for the graph instrument.

## Potentiometer



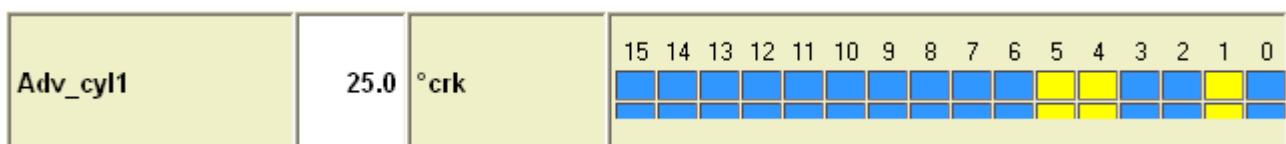
Potentiometer instrument is made up by items in text format (Name, Value and Unit), an interactive text item (Editor) and a graph item (State). Usually it's used for displaying measurement channels with Enum Output Format, and for sending to the ECU specific values selected from the Enum List. Editor item helps to select from the enum list the value to transmit. State item allows writing quickly the selected value on the ECU showing meanwhile the transmission state. When configured for channels with numerical Output Format, user can select values to send to the ECU by two spin buttons in the Editor item that ensure precision for a given step range value.

## Selector



Selector instrument is made up by a textual item (Name) and a graphic item (Selector). It operates as a switch, used to select values for enumerated measurement channels. All the available values or states for the channel are displayed on the graph instrument at the same time. Icon arrows under the graph instruments select next or previous value/state for the channel sequentially.

## Bitmap

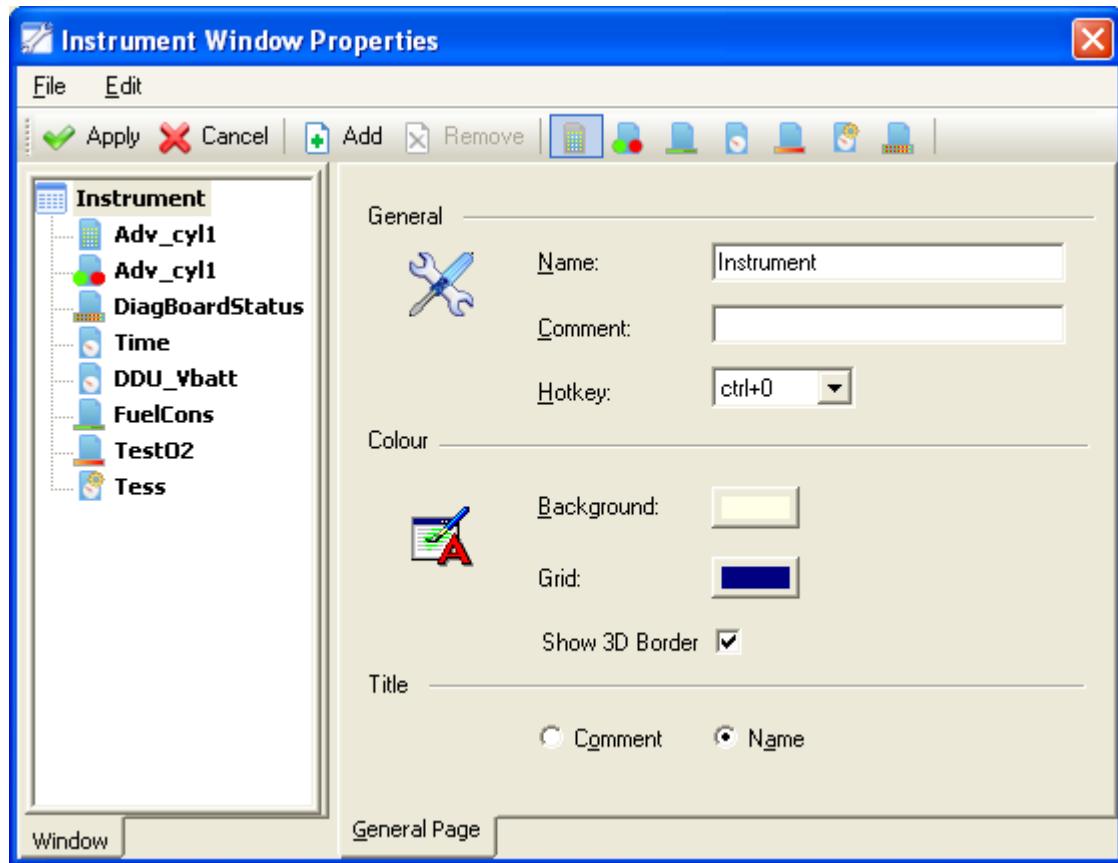


Bitmap instrument is made up by items in text format (Name, Value and Unit) and a graphic item (BitMapped).

The BitMapped item decomposes the visualization for the channel current value in bitwise format. User can select which bits to display and the graphic layout for each bit. The first sequence of bits represents the current value, while the second corresponds to the historical state (if the bit has changed its state). When moving with mouse cursor on each bit graphic rectangle, the description for that bit will be displayed in a tooltip.

## Instrument Window Properties

Menu command *Edit / Window Properties* opens the configuration interface for the whole Instrument window.



On the left pane, names for measurement channels configured as instruments in the window are listed. An icon on the left of each channel indicates the type of instrument.

Commands for managing the configuration window are in the embedded menu and toolbar.

On the right pane user can modify General window settings.

**Name:** the name for the window displayed in the caption title.

**Comment:** a string comment associated to the window.

**Hotkey:** short cut hotkey for selecting the window as the current one.

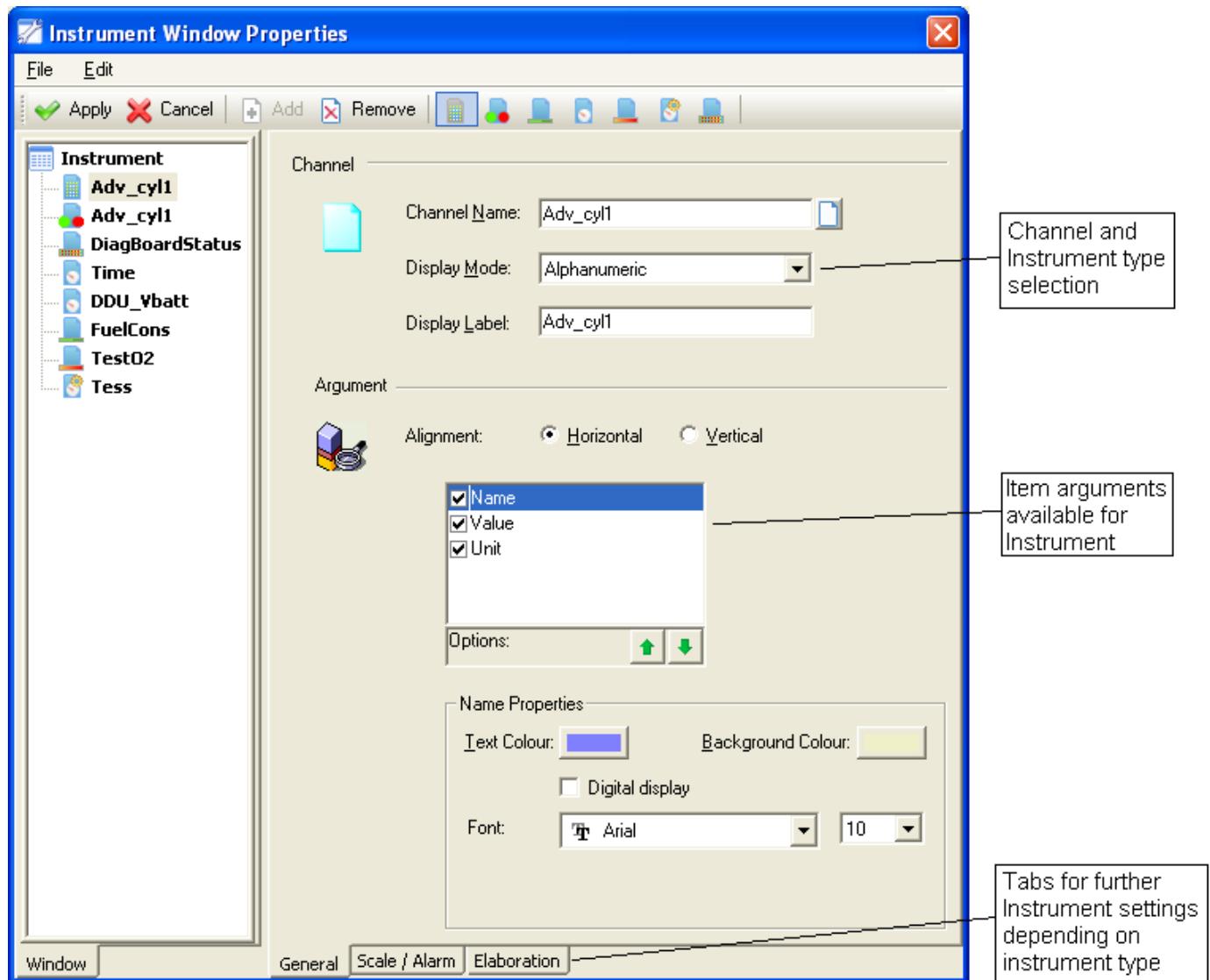
**Background:** colour for the window background area.

**Grid:** colour for the grid in the window background area.

**Show 3D Border:** enables 3D borders for channel instruments.

**Title (Comment / Name):** switches between Comment and Name to be displayed in the window caption title.

By double clicking on an instrument or by the context menu (Right click/Modify Instrument) you can change all the properties of the selected instrument.



## General

General page has two sections:

- **Channel**, for selecting measurement channel and instrument type;
- **Argument**, for managing argument items available for selected instrument type.

## Channel

**Channel Name:** the name of the measurement channel associated to instrument. The icon on the right opens the Channel Browser window for selecting a different channel.

**Display Mode:** switches between available instrument types.

**Display Label:** the text string to display in the Name argument item.

## Argument

**Alignment (Horizontal / Vertical):** switches the layout for instrument arguments.

List of available argument items for the selected instrument type. Items in this list can be moved or disabled. Selecting each item, user can modify its settings in the **Properties** area.

**Text Colour:** colour for text (available only for text items).

**Background Colour:** colour for item background.

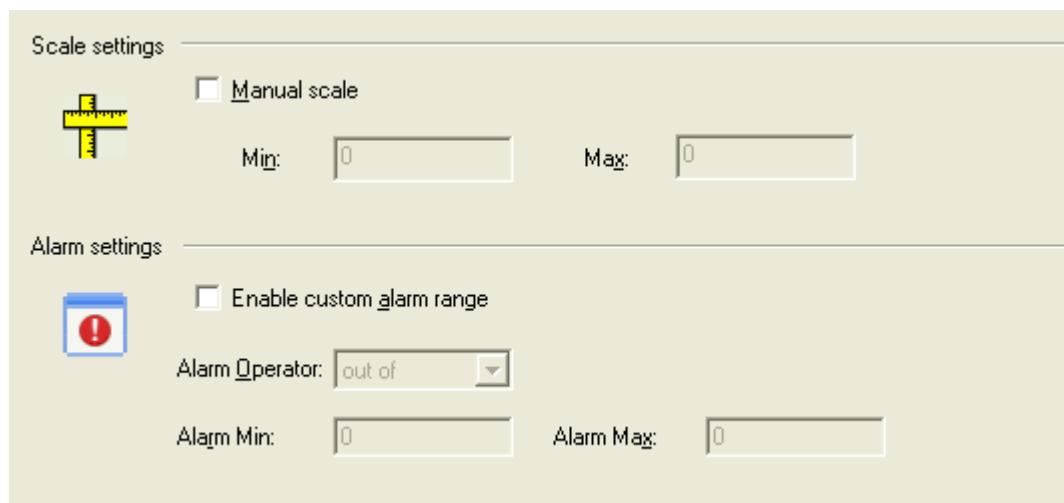
**Digital display:** switches digital display layout for text items.

**Font:** Family Font and Size for text items.

**Position (Inside / Outside):** item argument is integrated inside area for graphical item or independently (for text items of instruments BarGraph, Gauge and Selector).

**Show icon trend:** shows an icon indicating the trend for channel values historical sequence (available only for Value argument item of Alphanumeric instrument).

## Scale / Alarm



## Scale settings

**Manual scale:** enables a manual scale, defined by user.

**Min, Max:** Minimum and maximum values that the variable theoretically never reaches; values equal to or exceeding these limits are displayed with colours defined by the user in the configuration properties of the channel.

## Alarm settings

**Enable custom alarm range:** enables custom alarm range defined by user.

**Alarm Operator:** list of alarm operators for the alarm range.

**Alarm Min, Alarm Max:** Minimum and maximum acceptable values for normal operation of the product; values equal to or exceeding these limits are displayed with colours defined by the user in the configuration properties of the channel.

Selecting Bit-map in Alarm operator it's also possible to define alarms on each bit of channel value, as shown in figure below.

The user is allowed to assign a fault to each single bit in the channel, following the methods already supported for the configuration of the diagnostics.

The presentation of the channel is not modified: when one of those bit is set, SYSMA switches on the led.

The list of active errors will be easily accessible using the mouse.

Alarm settings

Enable custom alarm range

Alarm Operator: Bit-map

Alarm Min: 0      Alarm Max: 0

Bits Selection:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	---

#	Text
0	Bit 0
6	Bit 6
11	Bit 11
14	Bit 14
15	Bit 15

## Elaboration

The screenshot shows a software interface for configuring elaboration settings. At the top left is a 'Custom' checkbox. Below it is a section labeled 'Elaboration' with a formula input field containing  $=f(x)$ . To the right are four input fields for coefficients A, B, C, and D, each with a value (A: 1, B: 0, C: 0, D: 2). There is also a field for coefficient K with value 1. Below these is a 'P1-P2...' button. Underneath the formula input is a 'Elaboration Test' button and a text box showing the formula  $x' = ((xA + B) / (xC + D)) * K$ . At the bottom is an 'Output format' section with a dropdown menu showing 'Format: DEC' and 'Decimals: 1'. Below this is a 'Unit:' dropdown menu showing 'Unit: °crk'.

Before being displayed, values read in the electronic unit are converted using a set of coefficients that apply a unitary conversion by default. You may use coefficients in the channel list for the entire configuration, or replace these coefficients with values taken directly from the definition in the display window.

When returning values to the electronic unit, the reverse transformation is applied.

**Custom:** enables custom elaboration settings defined by user.

### Elaboration/A, B, C, D, K

Coefficients used to convert data read in the electronic units to physical sizes using the following formula:

$$x' = K * (x * A + B) / (x * C + D)$$

where  $x$  = value read and  $x'$  = converted value to be displayed.

### Elaboration/Test

To open a panel for verifying the linearization formula, click on the Test button.

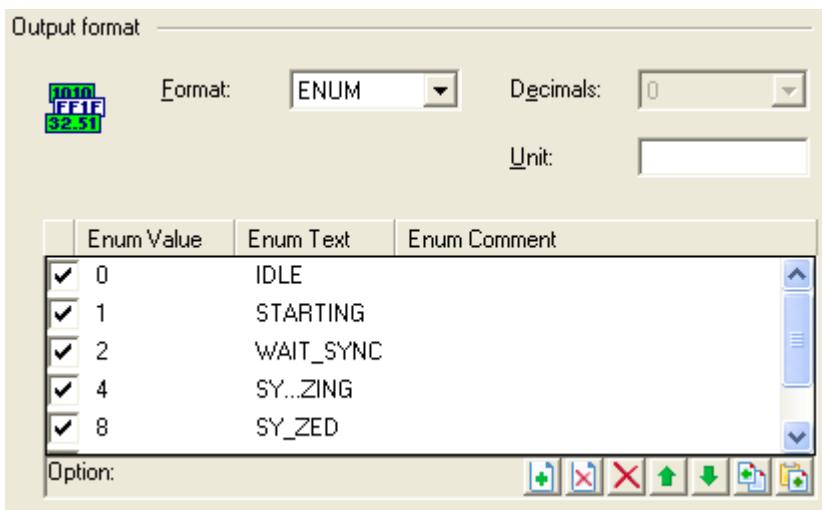
### Elaboration/P1-P2

To open a panel for calculating A and B for simple transformations providing two points ( $X1 \rightarrow Y1$ ;  $X2 \rightarrow Y2$ ), click on P1-P2 button.

### Format/Output Format

Display format, depending on the desired output: DEC (decimal), HEX (hexadecimal), FLOAT (scientific), ENUM (associated text with each value).

If you select ENUM format, you open a panel for editing the pairs: value and text.



This type of display replaces values with text. You create a list including all the possible pairs (value, text) either for the channel list, or for the local field in a window (Display Field - Custom).

The value must be exactly equal to the result of the conversion. (Therefore it is preferable to avoid the use of conversion coefficients.). If the value does not match any values in the list, the system displays "<?>".

**Enum Value:** value to compare with the channel's converted value.

**Enum Text:** text to display.

**Enum Comment:** general comments, available to the user.

To save the changes and close the window, click on apply button.

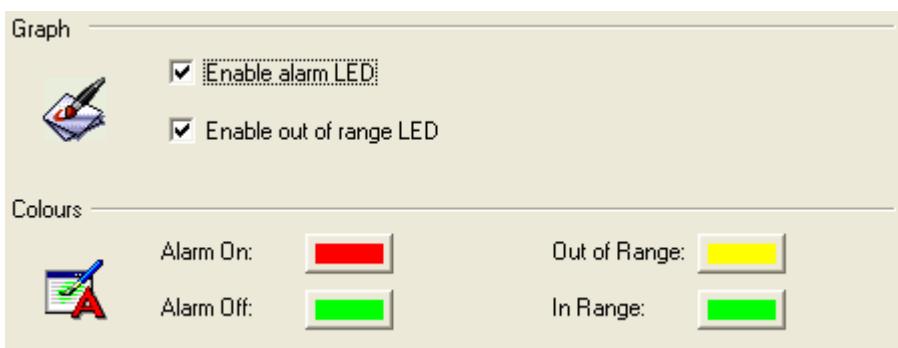
### Format/Decimal

Specify the number of digits to be displayed.

## Graph Options

Graph Options page allows to configure graphical items for instruments, and changes for each instrument type.

### Alphanumeric Alarm



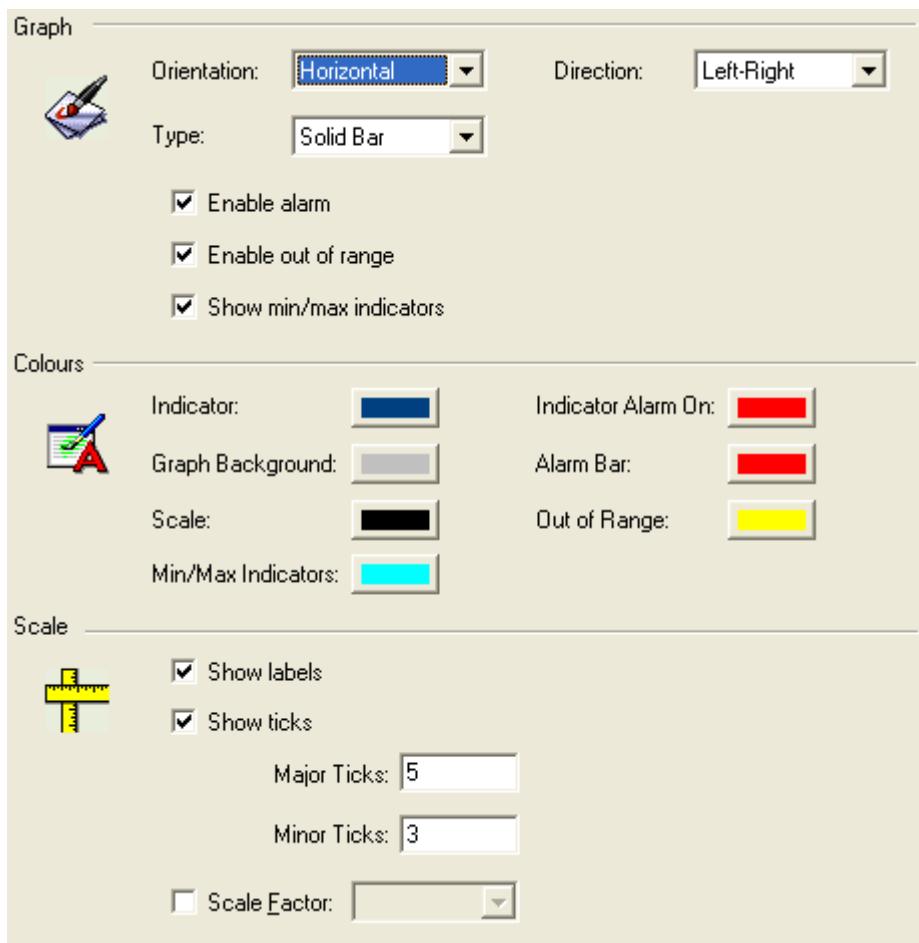
## Graph

**Enable Alarm LED, Enable out of range LED:** these options enable to show or hide graphical LEDs used to represent Alarm condition and Out of Range condition.

## Colours

**Alarm On - Alarm Off, Out of Range - In Range:** colours of graphical LEDs for Alarm condition, when the condition for current channel value is TRUE (On) or FALSE (Off), and for Out of Range condition when current channel value lies out or inside the range condition interval.

## BarGraph



## Graph

Settings for changing BarGraph layout: **Orientation** (Horizontal or Vertical) **Direction** (Left-Right / Right-Left, Up-Down / Down-Up depending on Orientation) and the **Type** for bar indicator (frame Solid Bar, Cursor, Cylindrical), options to display coloured bars for Alarm and Out of Range conditions (**Enable alarm**, **Enable out of range**), and Min / Max markers (**Show min/max indicators**).

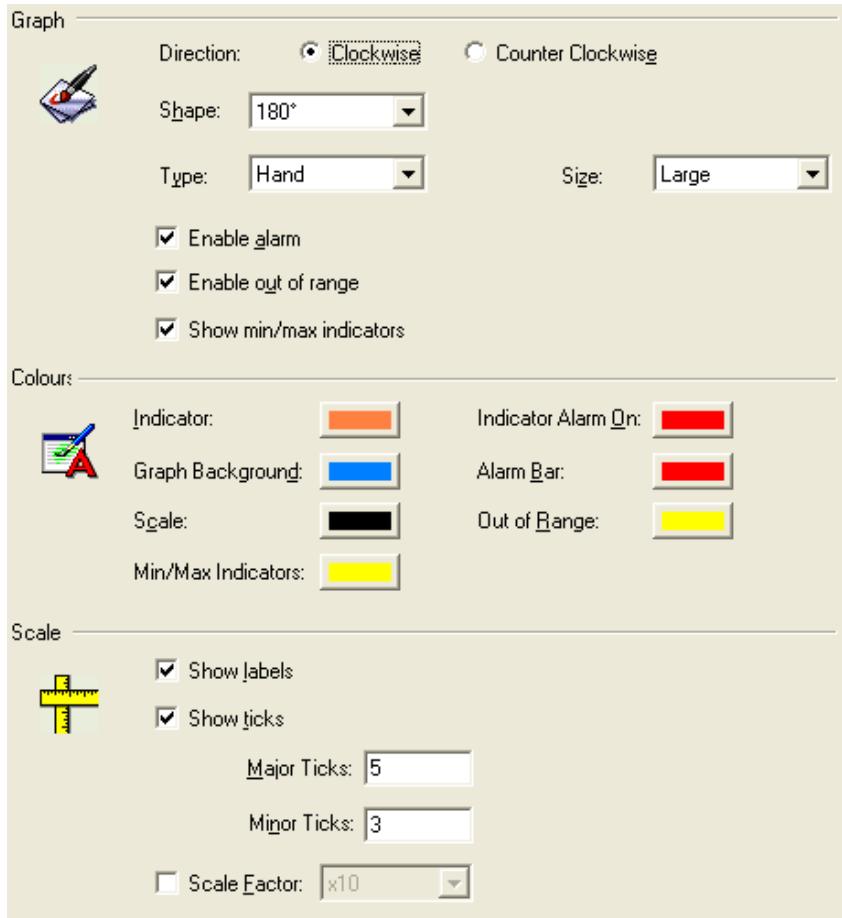
## Colours

Customized colours used to draw several items in the BarGraph instrument: **Indicator**, **Background**, **Scale** (applied to scale ticks and labels), **Min/Max Indicators**, **Indicator Alarm On** (applied to main bar element when current channel value lies inside Alarm condition), **Alarm Bar**, **Out of Range**.

## Scale

Settings for customizing Scale aspect: enable visualization for labels (**Show labels**) and scale ticks (**Show ticks**), number of scale divisions (**Major Ticks** and **Minor Ticks**), configuration for **Scale Factor**. Scale Factor applies to numeric values for channel current value in main bar item/indicator, scale ranges, Alarm and Out of Range conditions, Min/Max indicators.

## Gauge



## Graph

Settings for changing Gauge layout: **Direction** (Clockwise or Counter Clockwise), **Shape**, **Size** of indicator and the **Type** for indicator (frame Hand or Sector), options to display coloured stripes for Alarm and Out of Range conditions (**Enable alarm**, **Enable out of range**), and Min / Max markers (**Show min/max indicators**).

## Colours

Customized colours used to draw several items in the Gauge instrument: **Indicator**, **Background**, **Scale** (applied to scale ticks and labels), **Min/Max Indicators**, **Indicator Alarm On** (applied to indicator element when current channel value lies inside Alarm condition), **Alarm Bar**, **Out of Range**.

## Scale

Settings for customizing Scale aspect: enable visualization for labels (**Show labels**) and scale ticks (**Show ticks**), number of scale divisions (**Major Ticks** and **Minor Ticks**), configuration for **Scale Factor**.

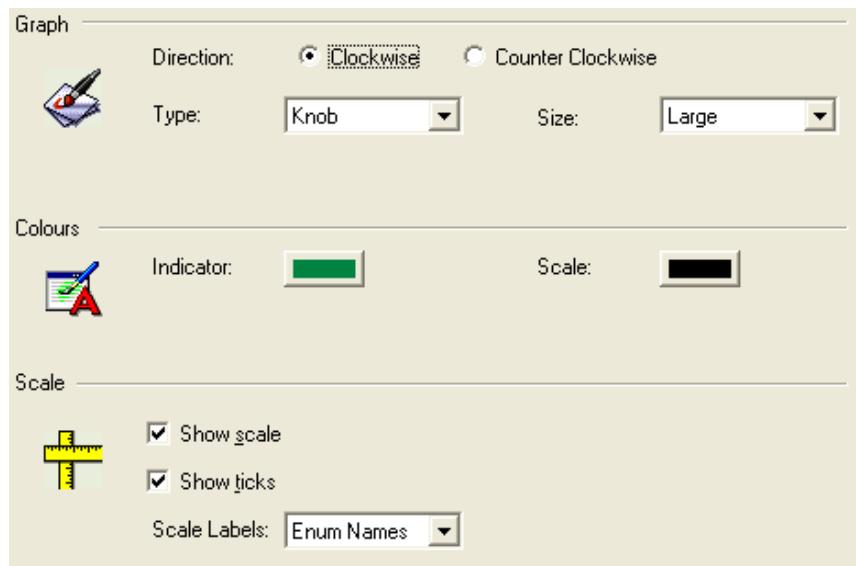
**Factor.** Scale Factor applies to numeric values for channel current value in main item/indicator, scale ranges, Alarm and Out of Range conditions, Min/Max indicators.

## Potentiometer



**Range and Steps** section defines the range of valid values that can be set in the potentiometer instrument (**Min. Value**, **Max. Value**) and the **Step** value applied to modify current value in Editor item argument using spin control arrows.

## Selector



### Graph

Settings for changing Selector layout: **Direction** (Clockwise or Counter Clockwise), **Size** of indicator and the **Type** for indicator (frame Hand Selector, or Knob).

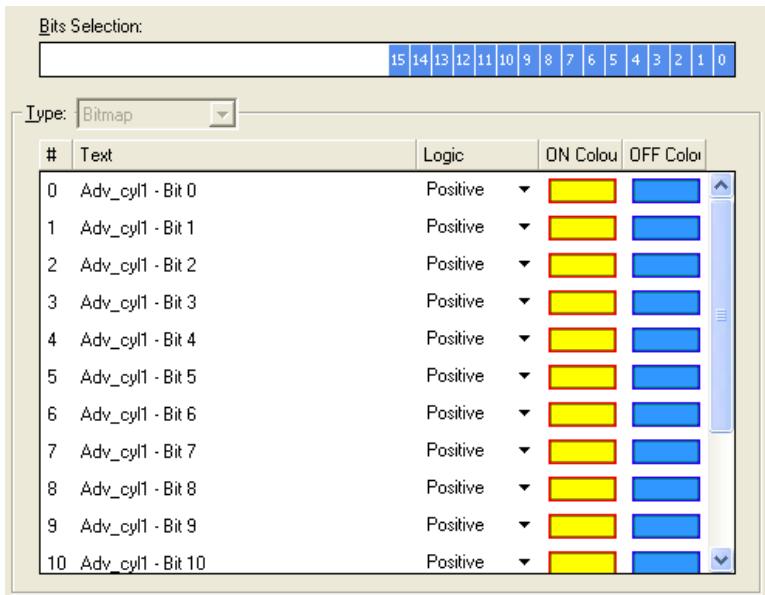
### Colours

Customized colours used to draw items in the Selector instrument: **Indicator**, and **Scale** (applied to scale ticks and labels).

### Scale

Settings for customizing Scale aspect: enable visualization for scale (**Show scale**) and scale ticks (**Show ticks**), type of string for **Scale Labels** (Enum Values or Enum Names).

## Bitmap



In **Bits Selection** user can select a sub-set of bits to be shown in the instrument, using mouse left button or keyboard arrows in combination with Ctrl or Shift.

For each bit is possible to configure following fields (use space bar to open edit mode for selected item):

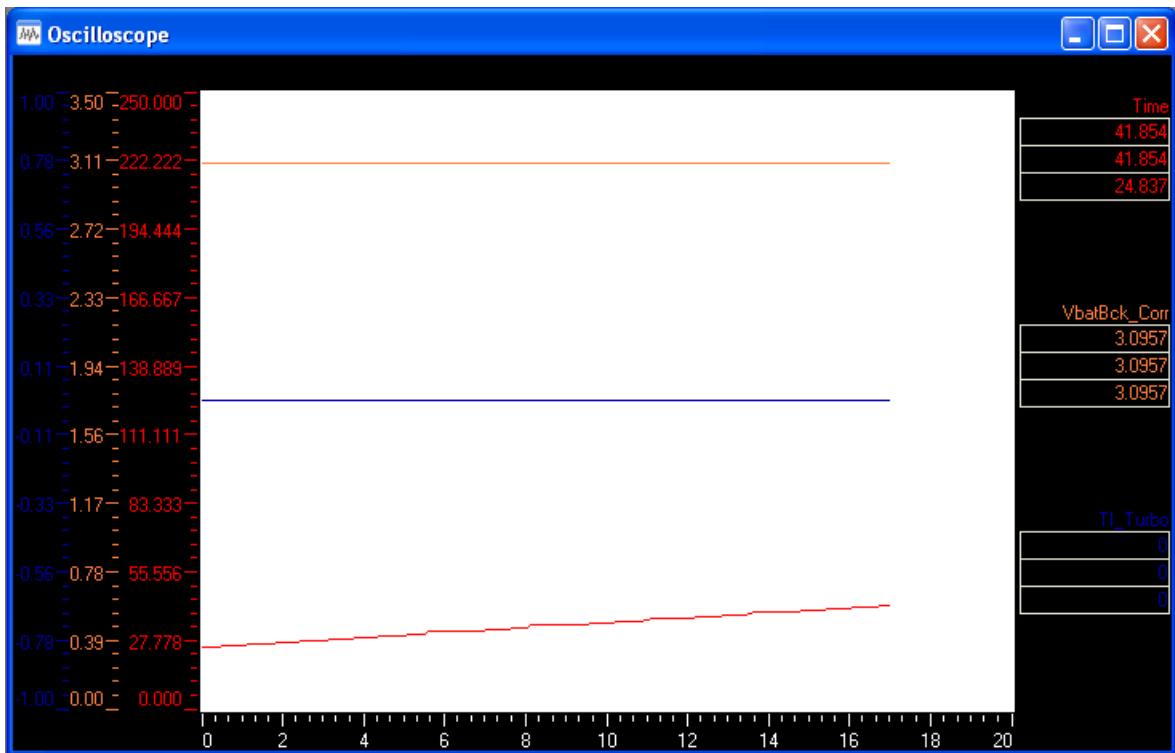
**Text:** string for bit description that will appear when moving mouse cursor on bit area.

**Logic:** switches the way ON and Off Colours are used to display if the specific bit is on or off for current channel value: **Positive**, bit it takes ON Colour when it's on - **Negative**, bit takes Off Colours if it's on.

**ON and Off Colour:** colours applied for showing if the specific bit is on or off for current channel value.

## Oscilloscope Window

The oscilloscope window allows showing graphically the evolution of up to 16 channels. This may be useful, for example, to show a motor starting procedure with RPM, oil pressure and temperature. It's also possible to use it as a small real-time acquisition system; the data may be saved in the Magneti Marelli .ZTX format in order to analyze them later with the WinTAX tool.



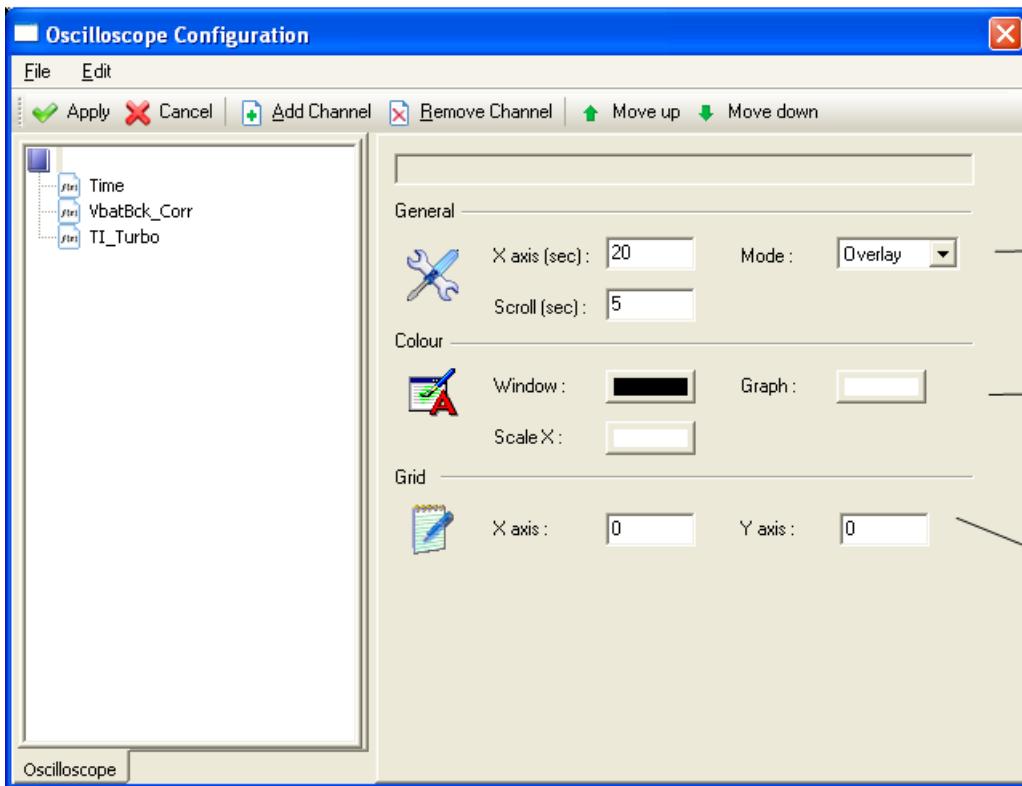
The SYSMA refresh time may be modified run-time when the oscilloscope window is active. The new refresh time is read from the project settings dialog (*File/Project Settings/Timing Section*) and is called "Acquisition Frequency". This value may be set to a minimum of 10 ms allowing data acquisition up to 100 Hz.

## Configuration

The channels can be added to the oscilloscope windows by drag them from the Channel Browser toolbar or, alternatively, by double click on them.

For the setup, double click on the channel or on the Oscilloscope window or use the right hand mouse button and select *Modify Graph*.

The Windows gives for each channel the current value as well as the max/min value.

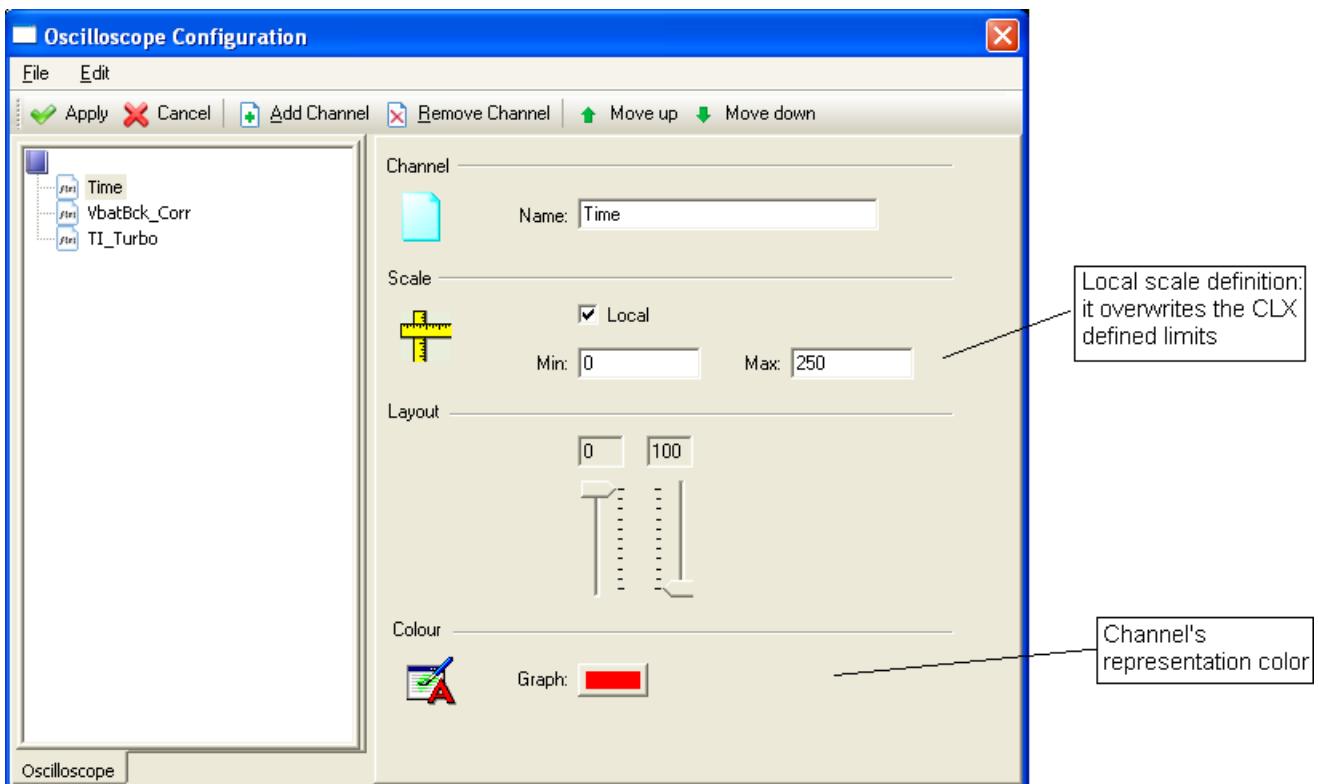


**X Axis:** defines the oscilloscope Time/Div (min 2s, max 300s).

**Scroll (sec):** defines the time to shift when graphs reach the right end of the window.

**Mode:** allows showing curves in Parallel, Overlay or in a user-defined layout (Manual).

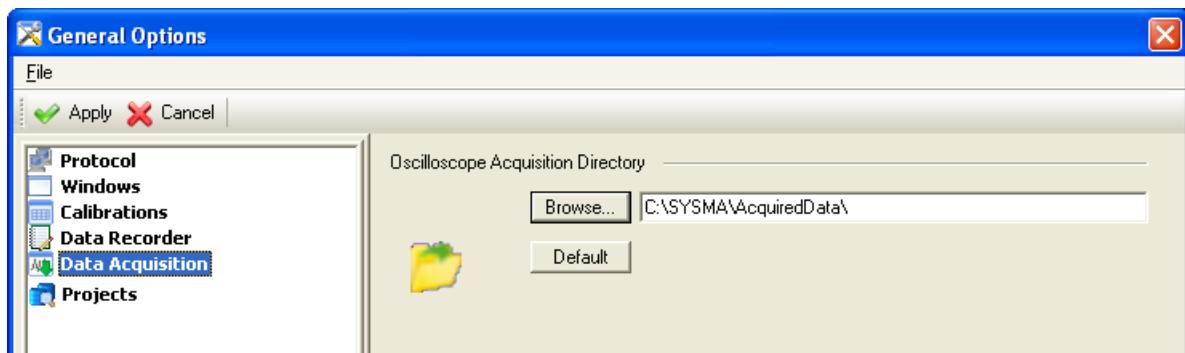
By selecting one of the configured channels its configuration page is displayed:



## Data acquisition

The data visualized in the oscilloscope window is acquired by default in a file (in ZTX format) that will be saved in the acquisition directory.

The path of the acquisition directory can be selected in the SYSMA's general options page (Tools/General Options).



The acquired data is saved automatically in a subfolder named with the local time/date parameters in the format: YYMMDD\_HHMMSS.

A new data acquisition archive is automatically generated every time you:

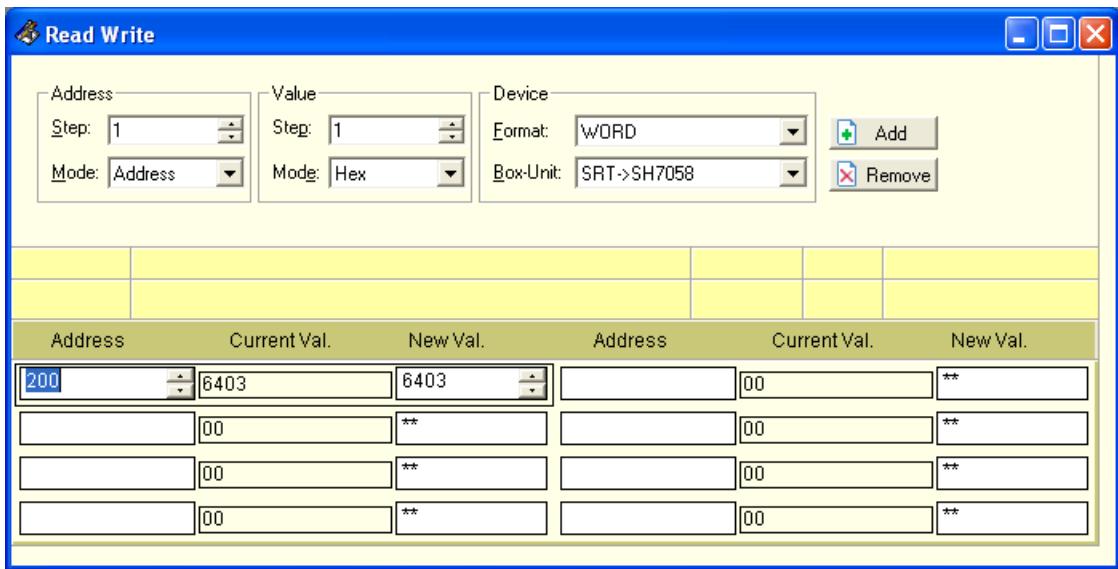
1. Start/Stop the communication protocol with the ECU
2. The oscilloscope window's configuration is modified (add/remove/modify the displayed channels...)
3. A layout with the oscilloscope windows is displayed/hidden.

You can manually save the acquired data and start a new file by pressing the key F4 in the oscilloscope window.

## Read Write Window

The Read Write window allows you to edit certain variables accessible in the memory of the connected ECU. Providing an address and a format performs addressing. The value read appears in the *Current Value* field on the left. You may enter a new value in the *New Value* field on the right, if the ECU authorizes writes.

You may move from one field to the other using the mouse or the  $\text{Ctrl} + \uparrow, \downarrow, \leftarrow, \rightarrow$  keys. The active field includes two spin buttons. When you must choose a field, the cursor moves to the address field. Use the *Tab* key to switch between the address and the value field.



The Read Write window configuration is saved in the layout data so you can save different configurations of the window in multiple layouts.

Buttons Add and Remove, in header area, allow to quick add or remove channel items in the window.

Right Mouse Click helps to select commands for managing the window: Add, Remove, Modify channels, Copy and Paste channel items, display or hide Edit and Info zones in the header area, access the configuration window.

## Creating a field

Select *Device Format* to modify the type of the variable to be read, sets the available types in the General Options menu (Tools/General Options): the sub-page "Windows" shows the available formats that can be changed by the user.

In Address Mode, select the way the channel will be localized: by address or name.

You may change the default destination Box-Unit using the *Device Box-Unit* list. Enter an address in the *Address* field and confirm by pressing Enter. If the electronic device accepts the address, the value read is displayed in the *Current Value* and *New Value* fields. If the addressing is incorrect the text "? ADDRESS" appears in the *New Value* field.

If the address field is empty the *New Value* field displays "\*\*\*". If the address is correct but the electronic device does not return any data, *New Value* displays "NO-RX".

Once you have correctly established the channel, you may copy the selection to the empty field located immediately after the current field by pressing *Ctrl+Pg-Down*, then modify the address using the *Up/Down* arrows. Confirm the address with the *Enter* key.

By default, data is displayed in hexadecimal format. For FLOATX/FLOAT3 fields the data is displayed in scientific calculator mode. The hexadecimal values may be displayed in a decimal way using the *Val.Mode* box.

## Changing a value

To change the value to be sent, select the *New value* field using the mouse, or use the *Tab* key to switch between the address and data fields. You may modify the value from the keyboard followed by the *Enter* key, or using by the modification keys (*Spin*, *Up-Down arrows*, *Pg-Up*, *Pg-Down*). In the latter case the value is sent at each modification, which is equivalent to *continuous transmission*.

The *Up/Down* keys change the value by +/-1. The *Pg-Up* and *Pg-Down* keys and the *spin* keys modify the value by one step (*Step Val*). You may change the step by selecting the *Step Val* field with the F3 function key, then modifying the value (decimal value) from the keyboard or with the *spin* buttons. Press *Enter* to return the cursor to the *New value* field.

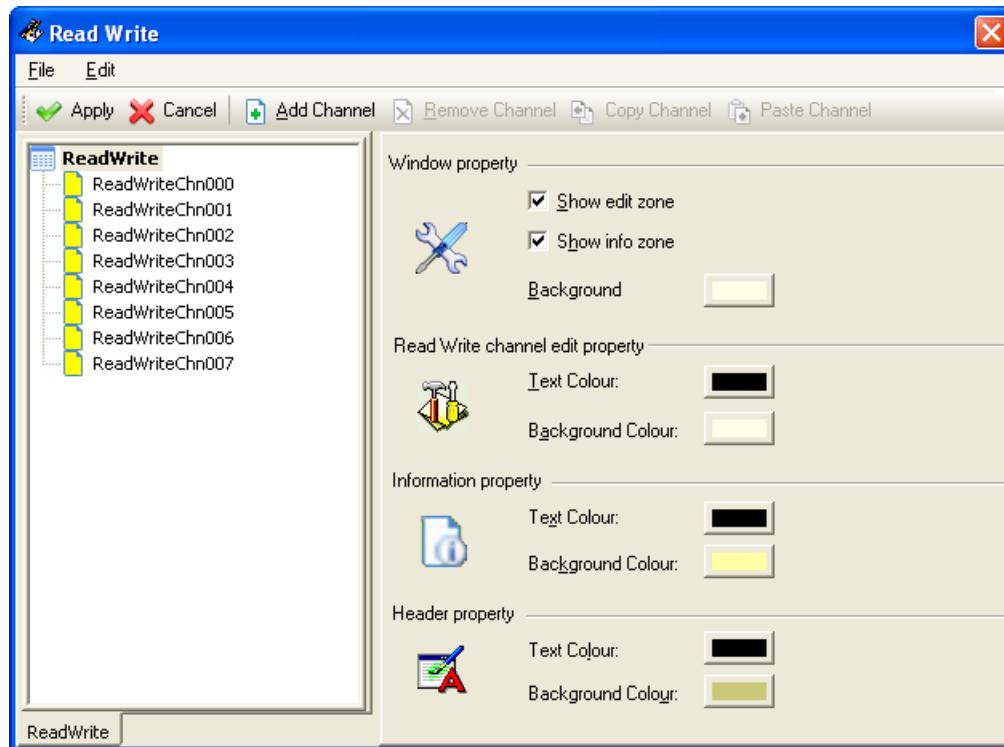
## Changing an address

You may change the address when the field is selected, either from the keyboard followed by the *Enter* key or by using the modification keys. In the latter case, the address is modified every time you press a key, which is equivalent to continuous transmission.

The *Up/Down* keys change the address to the next value (depending on the address mode for the processor used). Use the *Pg-Up/Pg-Down* and the *spin* keys to modify the address by +/-1 STEP (decimal value).

## Read Write configuration

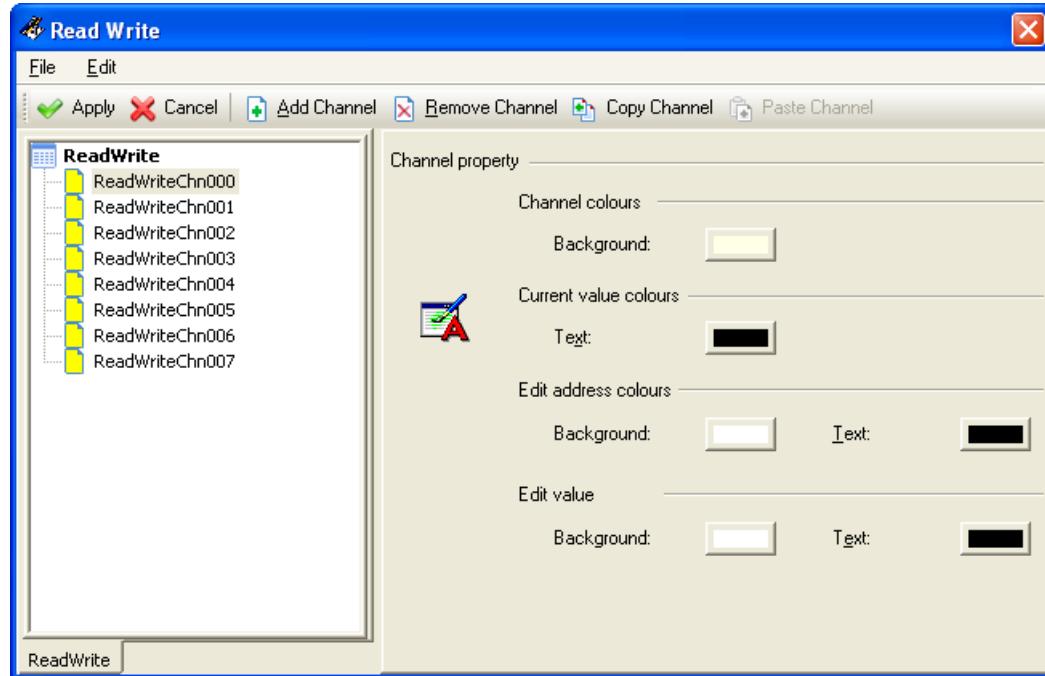
Using commands for main Edit menu or double clicking with mouse on window area, user can open interface windows to modify Read Write settings.



Show edit zone: shows or hides edit zone for Address, Value and Device settings selection

Show info zone: shows or hides information zone for current channel selected in the window.

User can modify the lists of channels with buttons in header area of this window (Add Channel, Remove Channel, Copy Channel, Paste Channel).



User can select text and background colours for each items of Read Write channels.

# Alarms Report Window

The Alarms Report window allows the visualization (current and historical) of the alarm status relative to one or more user configured channels.

Each alarm occurrence generates two messages in the "Alarm Channel Report" window (one when it appears (ON) and one when it goes (OFF)).

The message displayed contains the *Channel Name*, the *Condition* that caused it, a text (*Comment*), a field for the condition ON or OFF and the *Time* at which the alarm appeared (ON) and disappeared (OFF).

The screenshot shows the 'Alarms Report' window with two tables of data. The top table, titled 'Historical alarm list', contains 10 rows of historical alarm data from 14:45:05 to 14:45:31. The bottom table, titled 'Current status of configured alarms', contains 1 row for the current alarm at 14:45:31. A callout box labeled 'Historical alarm list' points to the top table, and another callout box labeled 'Current status of configured alarms.' points to the bottom table.

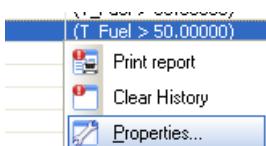
Time	Channel Name	On/Off	Condition	Comment
14:45:05	Fuel Temperature Alarm	ON	(T_Fuel > 50.00000)	Warning, stop the engine!
14:45:09	Fuel Temperature Alarm	OFF	(T_Fuel > 50.00000)	Warning, stop the engine!
14:45:12	Fuel Temperature Alarm	ON	(T_Fuel > 50.00000)	Warning, stop the engine!
14:45:16	Fuel Temperature Alarm	OFF	(T_Fuel > 50.00000)	Warning, stop the engine!
14:45:19	Fuel Temperature Alarm	ON	(T_Fuel > 50.00000)	Warning, stop the engine!
14:45:24	Fuel Temperature Alarm	OFF	(T_Fuel > 50.00000)	Warning, stop the engine!
14:45:26	Fuel Temperature Alarm	ON	(T_Fuel > 50.00000)	Warning, stop the engine!
14:45:28	Fuel Temperature Alarm	OFF	(T_Fuel > 50.00000)	Warning, stop the engine!
14:45:31	Fuel Temperature Alarm	ON	(T_Fuel > 50.00000)	Warning, stop the engine!

Time	Channel Name	On/Off	Condition	Comment
14:45:31	Fuel Temperature Alarm	ON	(T_Fuel > 50.00000)	Warning, stop the engine!

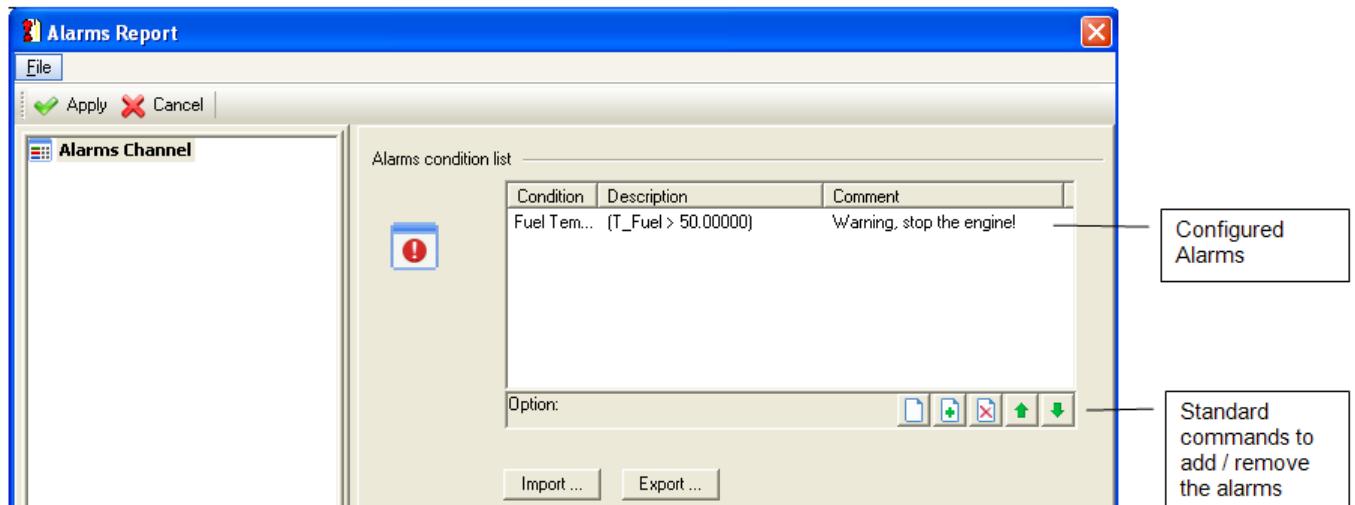
By right click the mouse on the windows the context menu allows the following operations:

1. Print the historical list (on file or printer);
2. Clear the historical list;
3. Configure the alarms to be detected.



## Alarms Configuration

By selecting the command "Properties" the following configuration page is displayed:

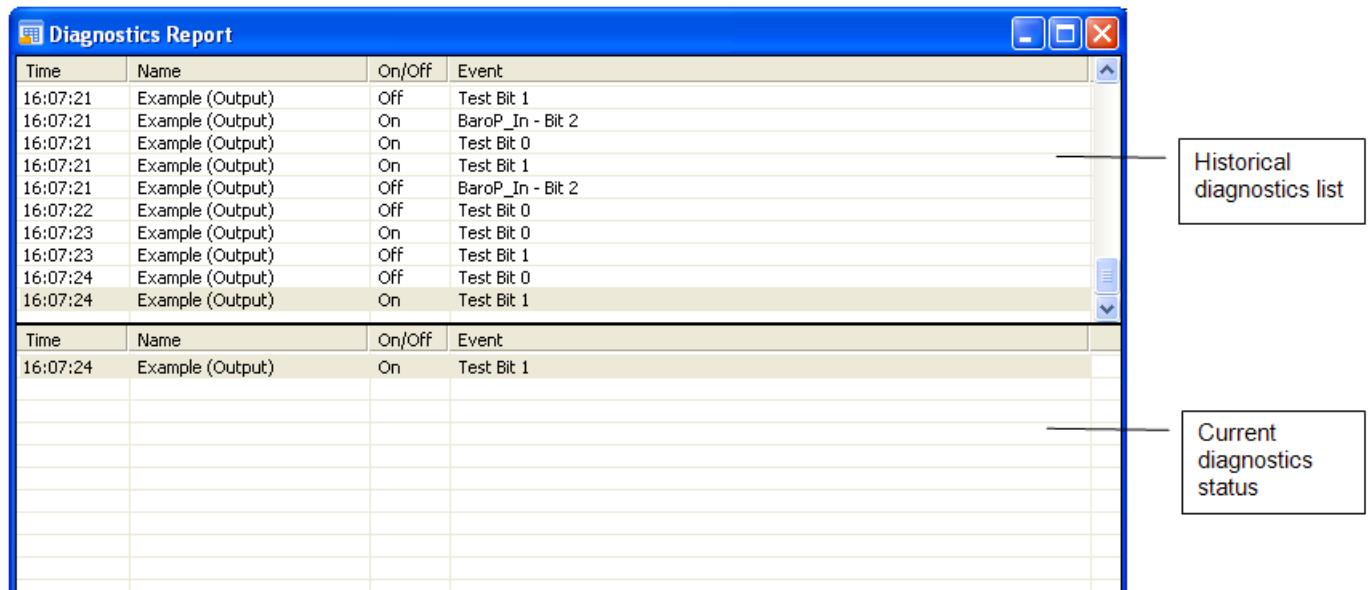


The buttons on the bottom of the alarms list allow the standard operations like Add, Remove, Move Up/Down. The configured alarms can be imported or exported with the relative buttons. By double click on a single alarm of the list you can setup the following parameters:

1. **Condition Name:** it's the value that will be shown in the main list when the alarm status changes;
  2. **Condition Comment:** optional string to be displayed in the report list near the condition name;
  3. **Condition Expression:** the mathematical expression that triggers the alarm.

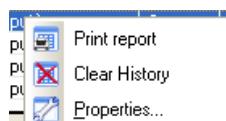
## Diagnostic Report Window

This window indicates the chronological order of the appearances (ON) and disappearances (OFF) of problems.



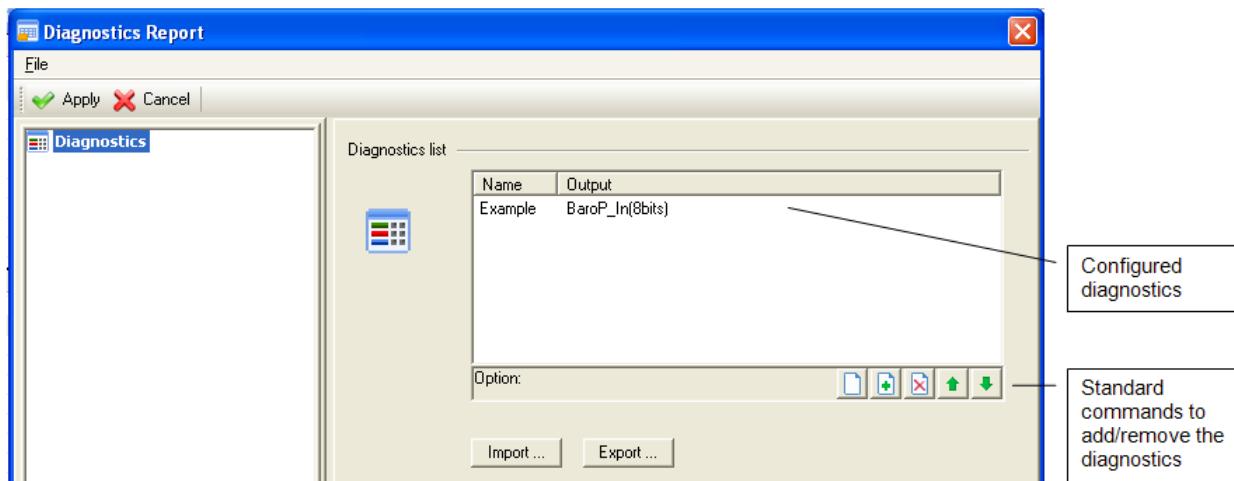
The message displayed contains the *Name*, the *Event* that caused it, a field for the condition *ON* or *OFF* and the *Time* at which the Diagnostic appeared (ON) and disappeared (OFF). By right click the mouse on the windows the context menu allows the following operations:

1. Print the historical list (on file or printer);
2. Clear the historical list;
3. Configure the diagnostics to be detected.

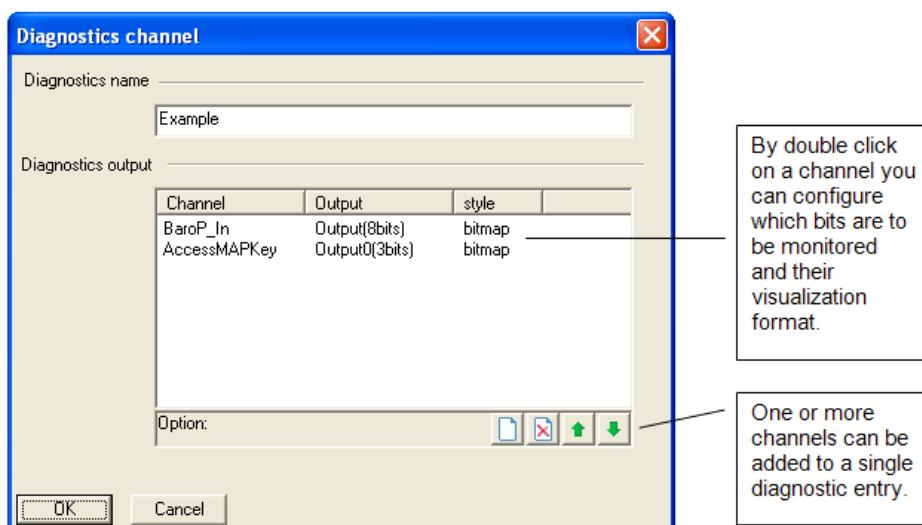


## Diagnostics Configuration

By selecting the command "Properties" the following configuration page is displayed:



The buttons on the bottom of the diagnostics list allow the standard operations like Add, Remove, Move Up/Down... The configured diagnostics can be imported or exported with the relative buttons. By double click on a single diagnostic of the list you can setup the following parameters:

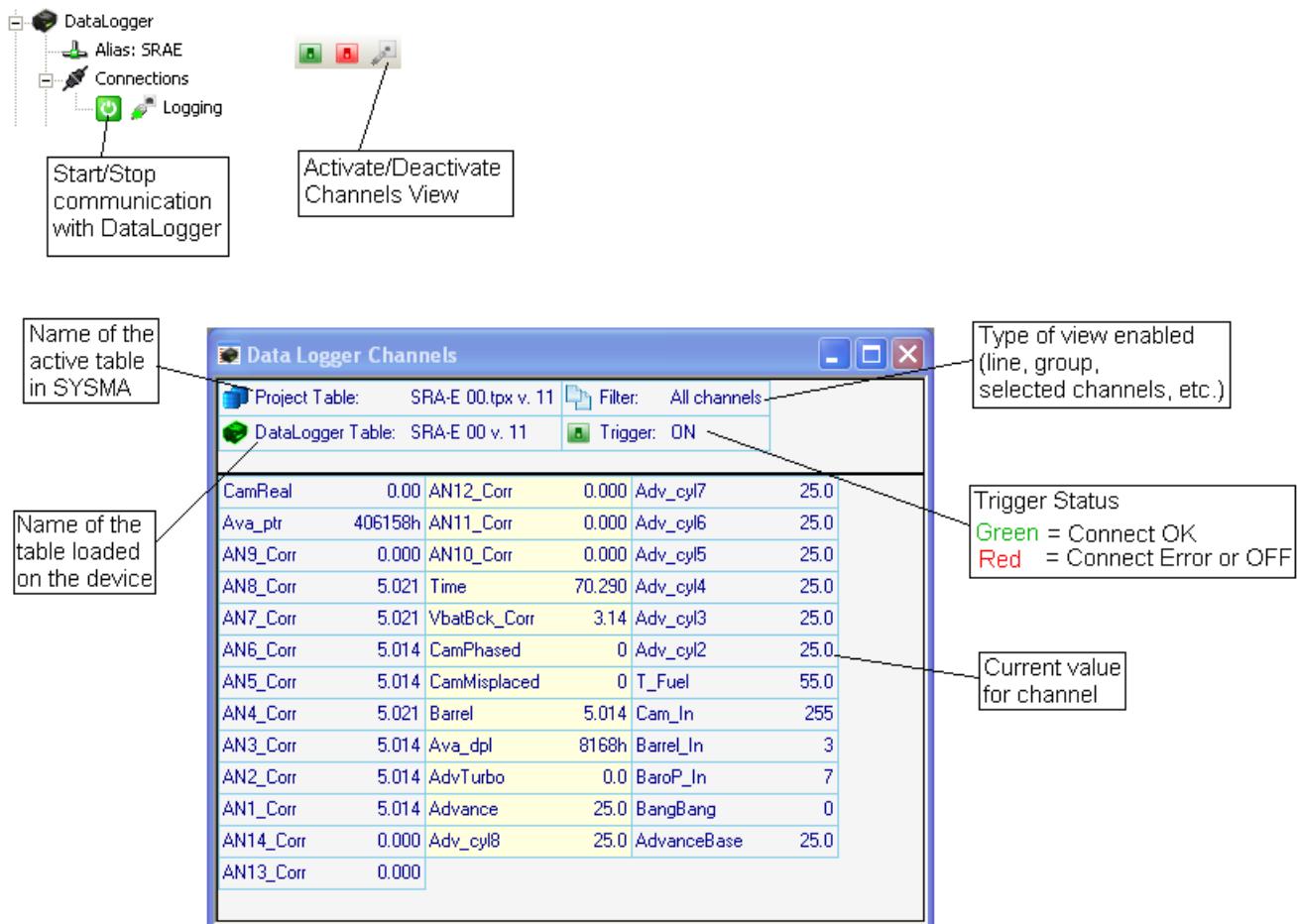


# Data Logger Channels Window

The *Data Logger Channels* window allows the visualization of the current values of the channels configured in the acquisition table plus some features necessary to adjust the sensors values (Zeros).

To open the *Data Logger Channel* window, select *View/ Data Logger Channel Window*. To enable *Data Logger Channel Window*, first enable the Ethernet communication using the command *DataLogger Communication Start/Stop* and then select the *DataLogger/Activate Channels View* command or click on the  icon.

Use *Logging* item for *DataLogger Connections* in *Project Workspace* window to check for communication status, or start/stop communication with data logger. Use button in *DataLogger* toolbar to switch *Data Logger Channels* window connection status, as shown in figure below.



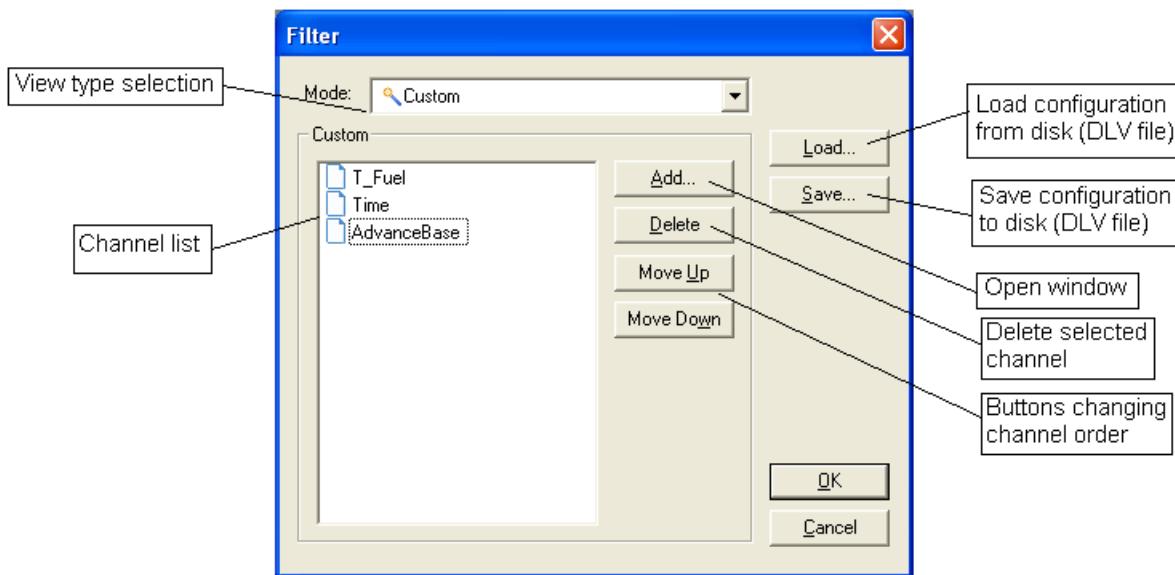
The *Data Logger Channels* window allows you to search for channels, simply type the name of the channel you wish to highlight and the cursor will be positioned on it. Right click in the window to change the display properties (apply channel filters and ordering).

If the *Communication* with the device is lost, the *Data Logger Channels* window will begin updating the values again as soon as the connection is re-established.

The *Data Logger Channels* window is used to run the zeroing command, which calculates the offsets to apply to the enabled channels, in order to achieve the target values configured. Once the offsets have been calculated, the logging table is transmitted to the logger.

To define the zeros, the current table needs to be the same as the current table of the device. The device table is highlighted in the *Data Logger Channels* window heading.

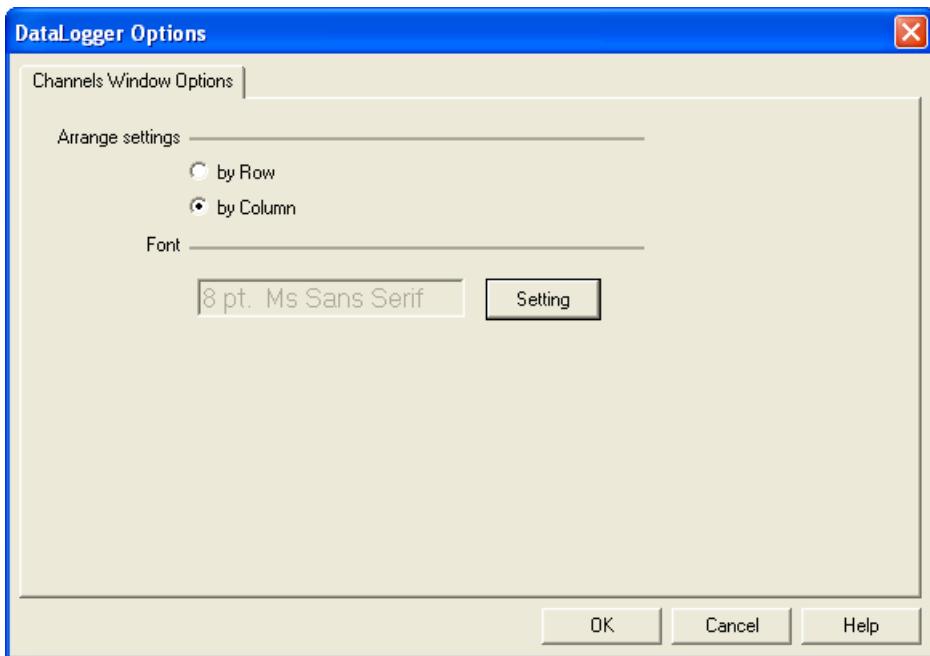
To modify the list of channels visible in the *Data Logger Channels* window, select the *Edit/Channel Properties...* command otherwise right click with the mouse when it is on the *Data Logger Channels* window:



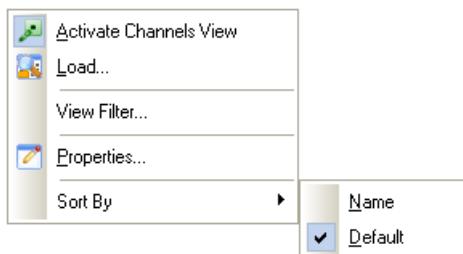
If the device is connected in *Data Logger Channels* window mode, the channel configuration is based on the table included in the device; otherwise the configuration is based on the SYSMA current table.

You may save the configuration just defined by pressing *Save....*. The generated file may be later loaded by pressing *Load...* or by using the *Data Logger Channels Window/Load...* command.

To further customize the appearance of the device you must use the configuration dialog *DataLogger/DataLogger Options*.



Commands and features that can be run in *Data Logger Channels* window are also available in the contextual popup menu that opens with right mouse button click on the window:



# ECU Channels Window

This window shows the values of all the channels from the SYSMA channel list.

Select View/ECU Channels Window.

Current values of the <Chan List> - C:\Program Files\Magneti Marelli Racing\SYSMA\Projects\sra-e...							
AccessMAPKey	0x0	AN6_Corr	5.014	DBW_P	0.00	DDU_TEMP2	0
Adv_cyl1	25.0	AN7_Corr	5.021	DBW_PID	-0.00	DDU_Vbatt	0.0
Adv_cyl2	25.0	AN8_Corr	5.021	DBW_Target	-0.00	DDU_Vref	0.0
Adv_cyl3	25.0	AN9_Corr	0.000	DBW_TPSAutoLe	0	DERRThrottleN	0
Adv_cyl4	25.0	Ava_dpl	0x8168	DBW_TPSTarget	-0.00	DERRThrottleP	0
Adv_cyl5	25.0	Ava_ptr	0x406158	DBW_TPSTarget	0.00	Diag_Acq_Ana	0x0
Adv_cyl6	25.0	BaroP_In	7	DBW_TPSTarget	5.00	DiagAcqAna1	0x4501
Adv_cyl7	25.0	Barrel	5.014	DDU_ACC_X	0	DiagAcqAna2	0x15
Adv_cyl8	25.0	Barrel_In	3	DDU_ACC_Y	0	DiagAcqAna3	0x4
Advance	25.0	Cam_In	255	DDU_ANA1	0	DiagBoardStatus	0x0
AdvanceBase	25.0	CamMisplaced	0	DDU_ANA2	0	DiagHB	0x0
AdvTurbo	0.0	CamPhased	0	DDU_ANA3	0	DiagInj	0
AN10_Corr	0.000	CamReal	0.00	DDU_ANA4	0	DiagInjContiH	0x0
AN11_Corr	0.000	CamToStart	-15808.86	DDU_ANA5	0	DiagInjContiL	0x0
AN12_Corr	0.000	CamUnPhased	0	DDU_Beacon	0x0	DiagKnock	0x0
AN13_Corr	0.000	DBW_D	0.00	DDU_HALL0	0.00	DiagPeda_TPS	0x0
AN14_Corr	0.000	DBW_DC	0.00	DDU_HALL1	0.00	DiagWheel	0x0
AN1_Corr	5.014	DBW_ERR	-0.00	DDU_HALL2	0.00	Distance	1615
AN2_Corr	5.014	DBW_I	0.00	DDU_HALL3	0.00	DistanceLap	0
AN3_Corr	5.014	DBW_LearnState	1	DDU_IN_DIGIT	0x0	Dla_Addr	0x0
AN4_Corr	5.021	DBW_LearnTime	0.0	DDU_Tbox	0	Dla_Err	0x0
AN5_Corr	5.014	DBW_ModeTest	0	DDU_TEMP1	0	Dla_Pos	0x0

All the channel values are read once. The user may then select a channel and use the "read" button to refresh the channel value, or use the "read all" button to update all the list.

# ECU

## ECU Settings

In order to connect to an ECU device and operate with it, you must configure some options available in the *General Options* setup window. These settings are common to the entire program and don't depend on the currently loaded project.

Conversely other settings are relative to the loaded project and are available in *Project Setup* window.

- **General Options**
- **Project Setup**

## General Options

Settings in General Options are common overall the program and don't depend on the currently loaded project. Run *General Options* command in main *Tools* menu to open the *General Options* window. The window is divided into different pages, each one dealing with specific arguments of the configuration:

- **Protocol**
- **Windows**
- **Calibrations**
- **Data Recorder**
- **Data Acquisition**
- **Projects.**

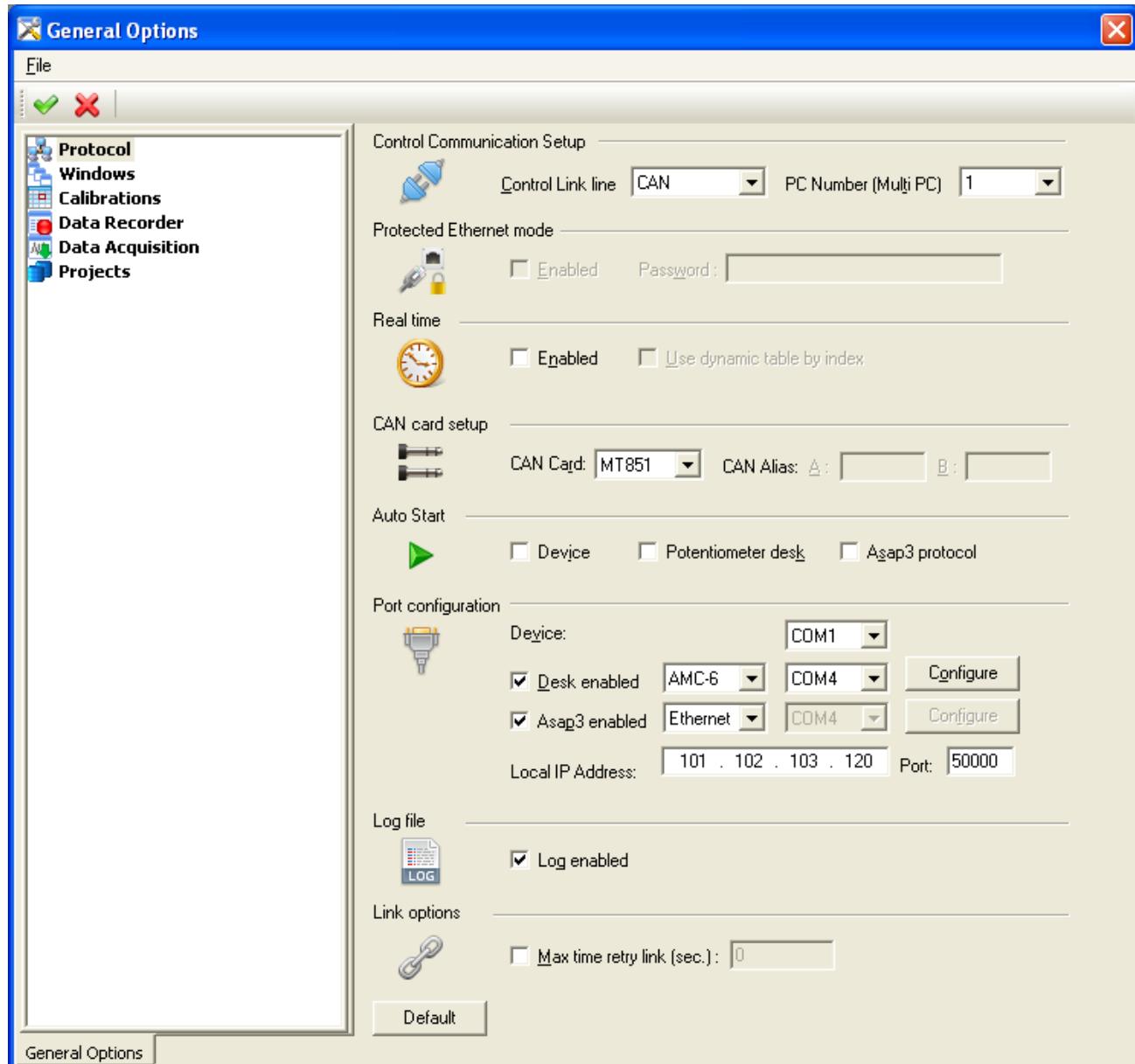
## Project Setup

Settings described in this chapter are related to the ECU but are saved in the project's data configuration. Run *Project Setup...* command in main *File* menu to open the *Project Setup* window. The window is divided into different pages, each one dealing with specific arguments of the configuration:

- **Miscellaneous**
- **String list**
- **Timing**
- **Mapping**
- **ASAP3**
- **Potentiometer Desk.**

# General Options

## Protocol



### Control Communication Setup section

**Control Link Line:** Selects the type of connection:

- Ethernet link/CAN link for the MTP protocol
- Blue Tooth

**PC Number (Multi PC):** Selects the running number (1 to 4) of the PC in the MTP network.

### **Protected Ethernet mode** section

**Enabled:** This enables a protection level when changing the alias name for the Ethernet connection. SYSMA will require a password before changing its destination system.

**Password:** Password to avoid erroneous change of destination. This is not encrypted since the goal is not security but confirmation.

### **Real time** section

Some options work only with specific ECU firmware.

**Enabled:** Selects a light mode for the protocol allowing to reduce the traffic when used through DST telemetry radio. In particular the "static" address table is not read from ECU.

**Use dynamic table by index:** Relative channels are inserted in "dynamic table" by index (rather than using the static table for address resolution).

### **CAN Card Setup** section

**CAN Card:** Selects the CAN card interface: Marelli-PCMCIA-MT851, VECTOR CAN-AC2-PCI or PEAK USB connect.

**CAN Alias:** Optionally gives an alias name for each of the two CAN channels when using the VECTOR card.

### **Auto Start** section

**Device:** On/Off for communication with the electronic device

**Potentiometer desk:** On/Off for the link with the external potentiometer desk (if the "desk enabled" option is selected).

**Asap3 protocol:** On/Off for the dynamometric bench data acquisition system.

### **Port Configuration** section

Selects the port for serial link with ECU/AMC Pot Desk/Dyno or for Ethernet with Asap3 enabled.

Ethernet allows to configure the Local IP Address and Port for TCP/IP communication.

Enables to modify the default parameters set in current project.

### **Log File** section

When this option (*Log enabled*) is selected, a SYSMA.LOG file is created. It's a circular memory buffer in which are stored, in chronological order, the traces of all the writing in the ECU commands (Read/Write, Potentiometer, Hot keys, Calibration Tables, ...).

### **Link Options** section

Automatic link-off after time-out. When activating this option (Max time retry link), it is necessary to fill in the value (in seconds) of the trying to connect time-out.

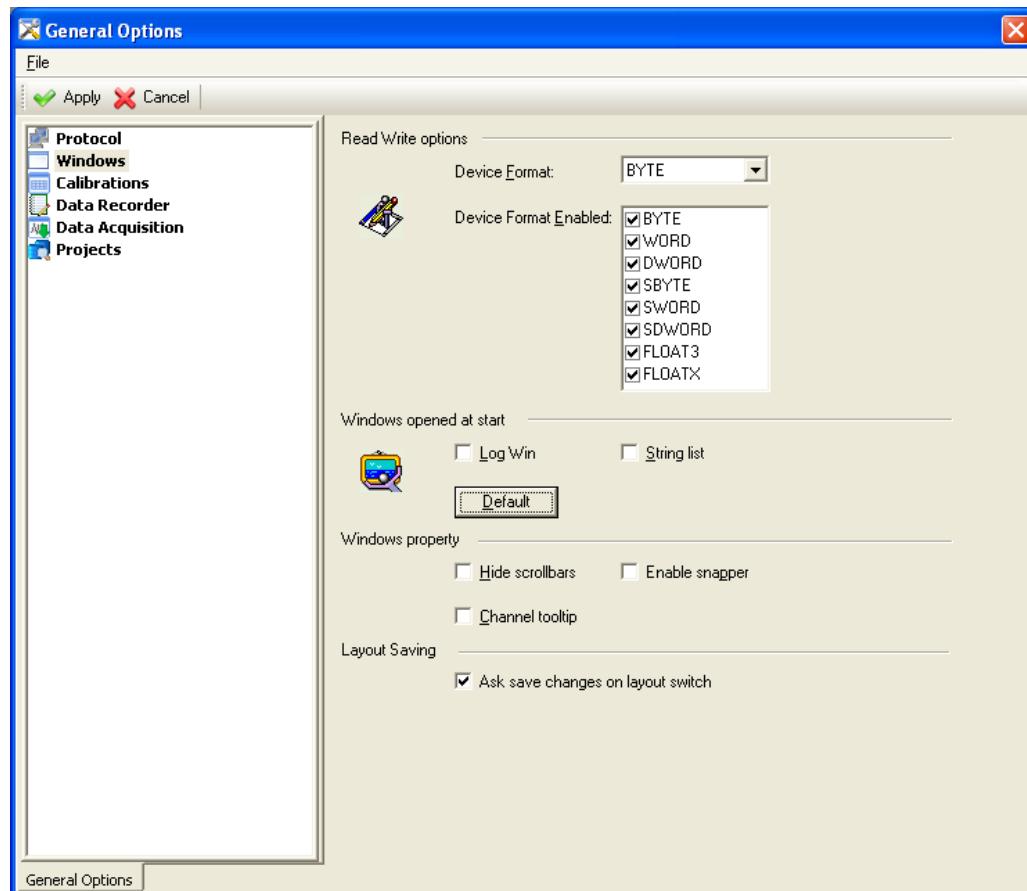
### **Real time mode** notes

The "Real-time mode", used when working through radio transmission, reduces the protocol load in the following way:

- In the same way, the channels with destinations=E2PROM cannot be attached to a particular processor, and this attachment must be made by using specific keys in the DEV file (see Device Description File)
- On the other hand, the fact of not using the "read release" command allows to reduce the PC buffer down to 8, allowing protocol recovery even if radio is very poor.
- The static table is not downloaded from each processor, so channel in display/pot windows must be inserted in dynamic table by using absolute addresses. It's possible to use relative channels in display windows by using the option in preferences "Use dynamic table by index" if supported by the ECU firmware.
- The protocol never goes in timeout and the connection is always accepted, so a particular care must be taken not to connect 2 PCs with the same running number.
- In order to support radio holes, calibration tables writes are made using an infinite number of retry, the user must decide by himself to kill the process by pressing ESCAPE.
- It's possible to add a CRC control for calibration tables writes allowing to confirm the correct radio transmission.
- It's also possible to send tables on-board and write to the final destination only on request (this to avoid partial writing in case of radio disconnection during transmission).

Note for table read/write: in real-time mode the calibration tables read or written are made with an infinite number of retry allowing radio holes during calibration tables transmission without aborting after a partial transfer. (Abort must be made manually by striking ESCAPE if needed).

## Windows



**Read Write** options section contains settings for *Read Write* window.

**Device Format:** select the default Device Format for items in Read Write window.

**Device Format Enabled:** select formats to enable in Read Write window from the list.

**Windows opened at start** section allows to set if *Log Win* and *String list* windows must be opened when starting SYSMA. *Default* button restores default for this section.

**Windows property** section has some further options for generic SYSMA windows management.

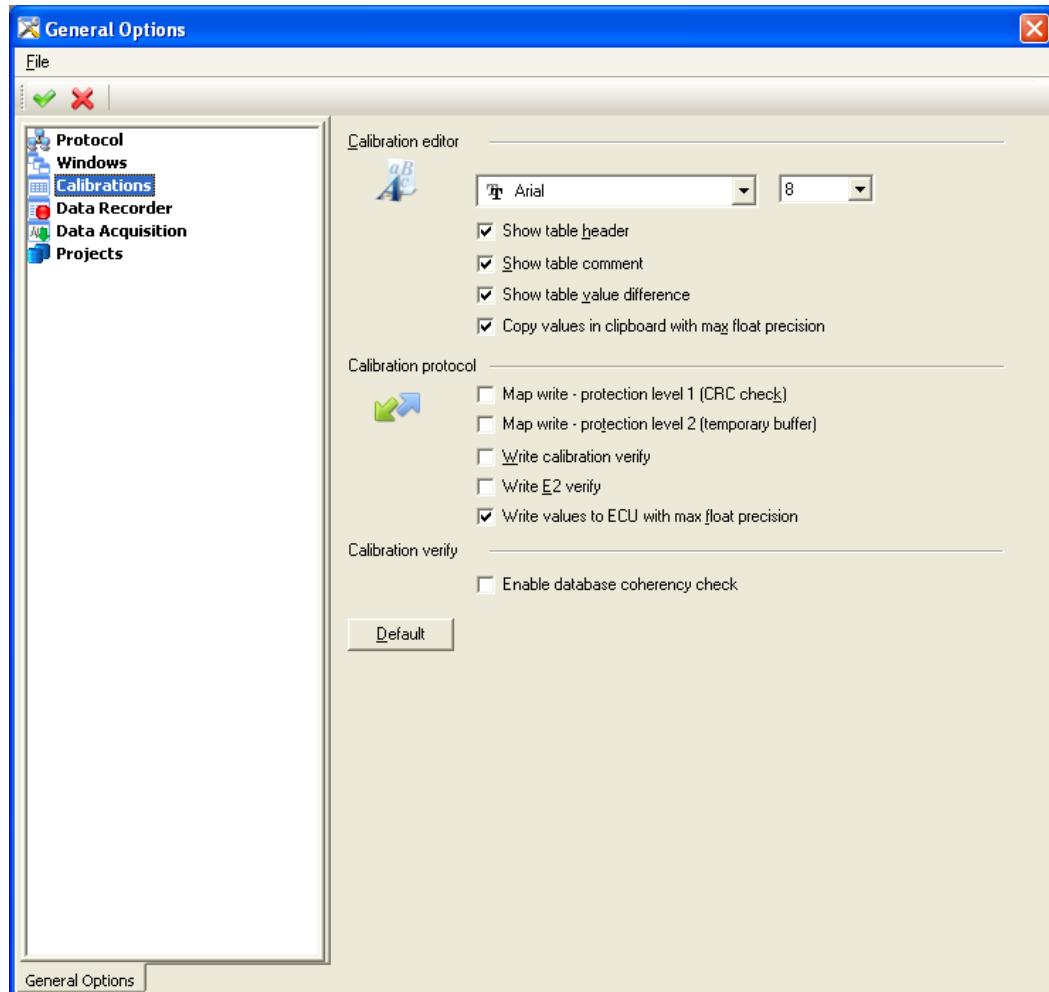
**Hide scrollbars:** if enabled this option hides scrollbars in SYSMA Instrument windows.

**Enable snapper:** enables snap management when user moves SYSMA windows and changes their placement in the work area.

**Channel tooltip:** enables tooltip display for channel in Instrument windows when mouse cursor is in channel instrument area.

**Ask save changes on layout switch:** if enabled, this options checks for modifications in current layout and prompt user to save when switching to another layout.

## Calibrations



### **Calibration editor** section

You can select the character fonts to be used in the alphanumeric window.

**Show table header:** This option enables visualization of header zone in alphanumeric table windows.

**Show table comment:** This option enables visualization of comment in header zone for alphanumeric table windows.

**Show table values difference:** Opens the "Info" window when editing tables (information on variations between the initial and current values).

**Copy values in clipboard with max float precision:** If this check is selected, values copied in clipboard will have a number of decimals consistent with conversion formula of calibration channels, ignoring the value set for Format Decimals (see Calibration Properties in ECU Calibration).

### **Calibration protocol** section

**Map write - protection level 1 (CRC check):** Each calibration table is sent with a complementary CRC control (for radio error detection). Provided that the ECU's firmware accepts these commands.

**Map write - protection level 2 (temporary buffer):** Tables are sent in a temporary buffer onboard and written in final destination only on specific request.

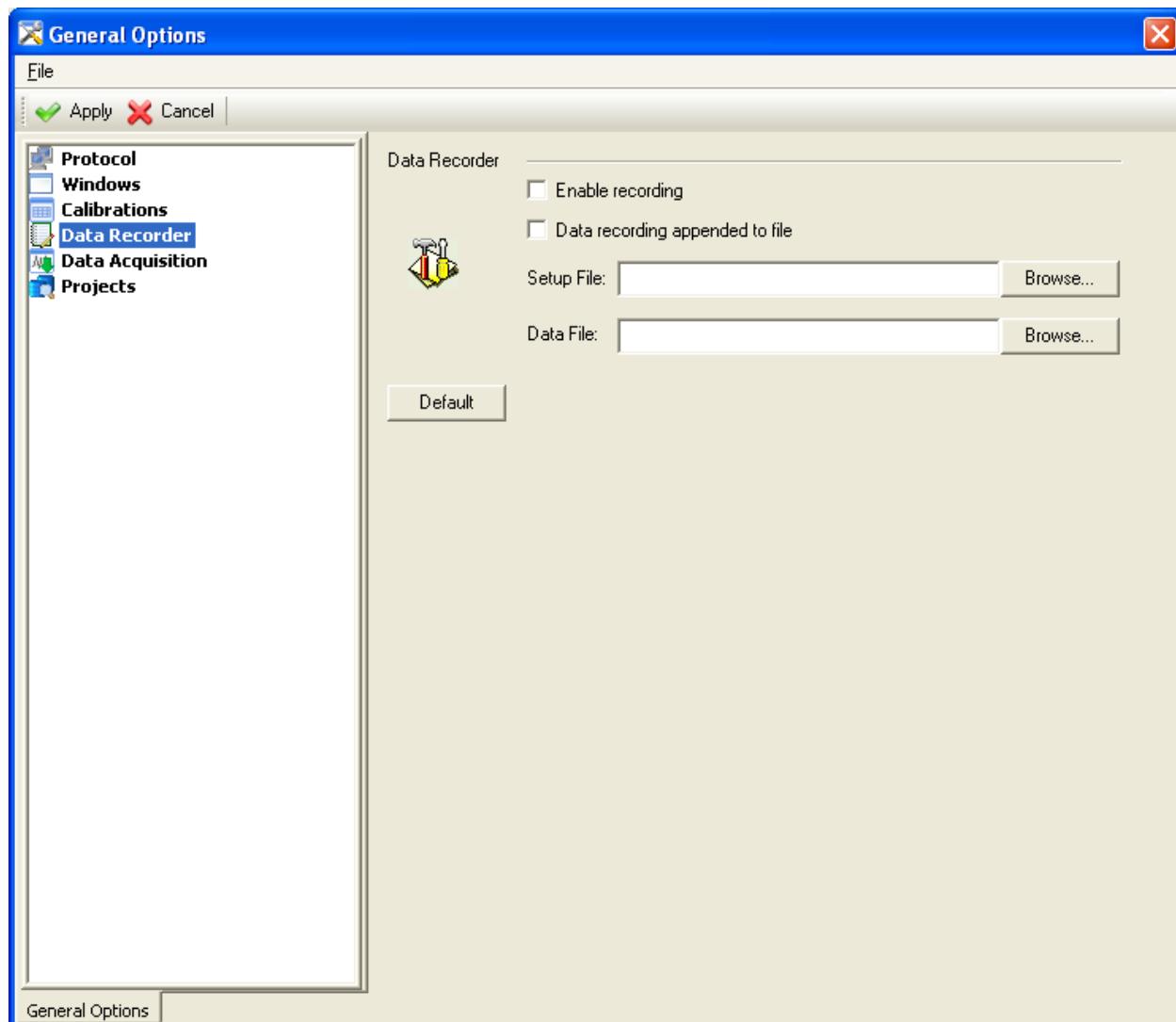
**Write Calibration verify:** Verifies all Calibration writes (\*)

**Write E2 verify:** Verifies all writes to .TAB files. (\*)

**Write values to ECU with max float precision:** If this check is selected, values sent to ECU will have a number of decimals consistent with conversion formula of calibration channels, ignoring the value set for Format Decimals (see Calibration Properties in ECU Calibration).

(\*) Most electronic devices perform their own write verification; you may save time with no risk by not performing this verification.

## Data Recorder



**Enable recording:** Automatically starts a data recording session.

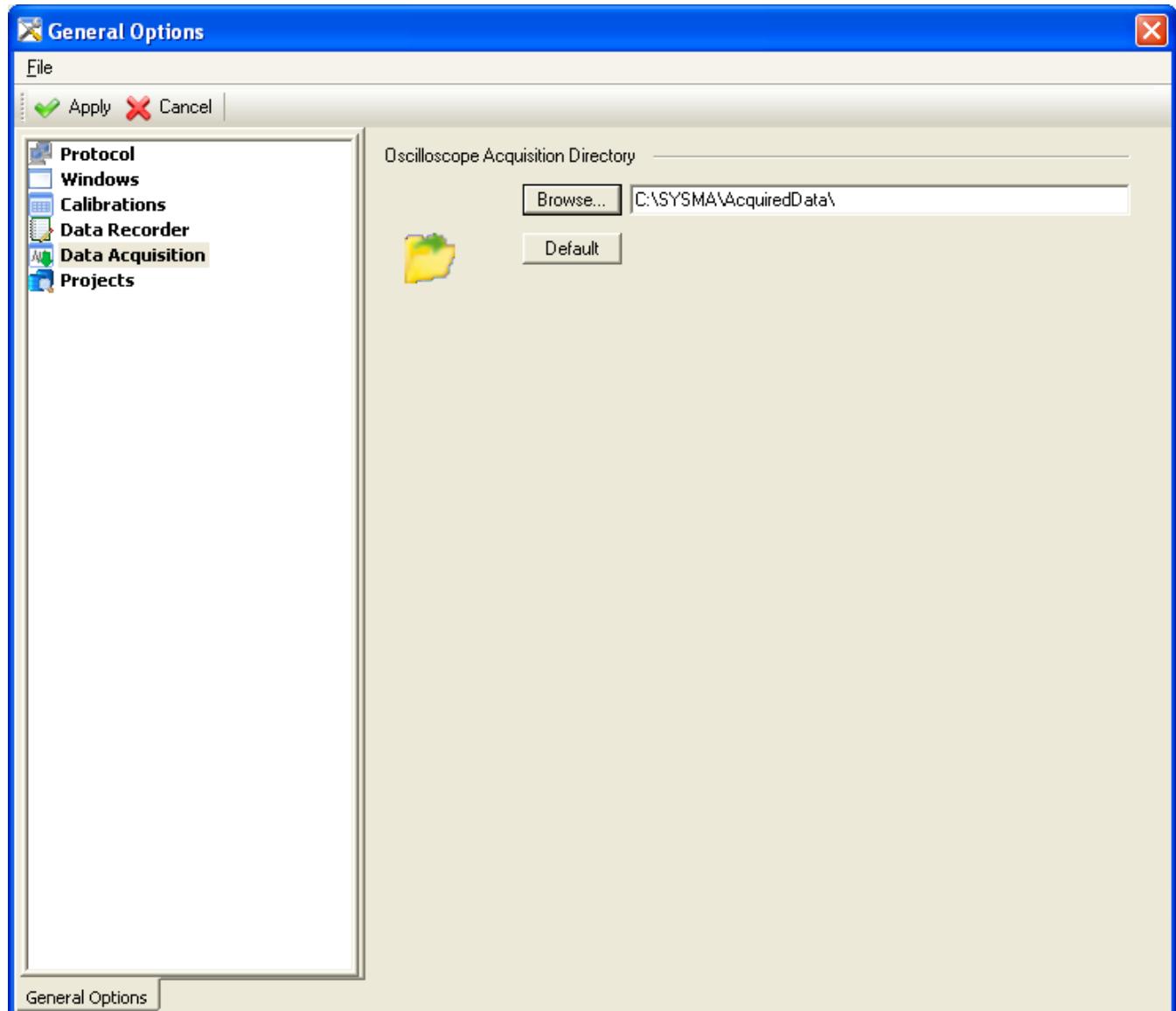
**Data recording appended to file:** Adds new sessions to the end of the file if checked (erases the file before restarting if not checked)

**Setup File:** Selects the .WPF file. *Browse* button on the right opens standard Windows window for file browsing.

**Data File:** Selects the .PQT file. *Browse* button on the right opens standard Windows window for file browsing.

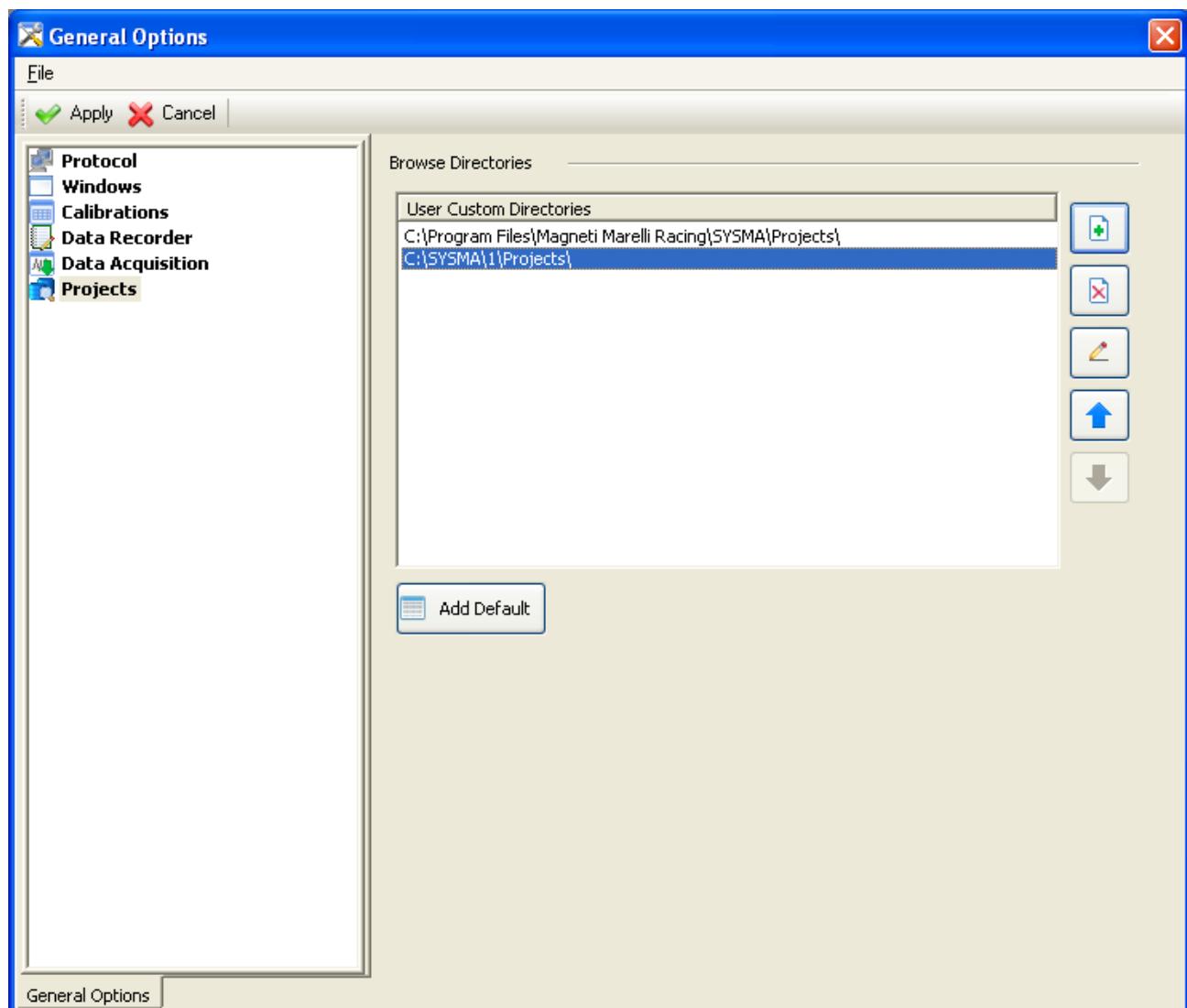
**Default:** this button restore default settings for *Data Recorder* page.

## Data Acquisition



This page allows to specify the folder where acquired data will be saved. Use *Browse* button to select a directory different from default, and *Default* button to restore the default directory.

## Projects



Project page allows to configure a list of paths where SYSMA will search for project configuration files. User can add several custom directories in the list and change their sequence.

**User Custom Directories:** list of directories added by user.

**Add Default:** adds the default directory for project to the list

 : opens standard Windows window for browsing a new directory and add it to the list.

 : removes selected items from the list.

 : allows to edit the path for selected item using keyboard.

 : moves selected items up in the list.

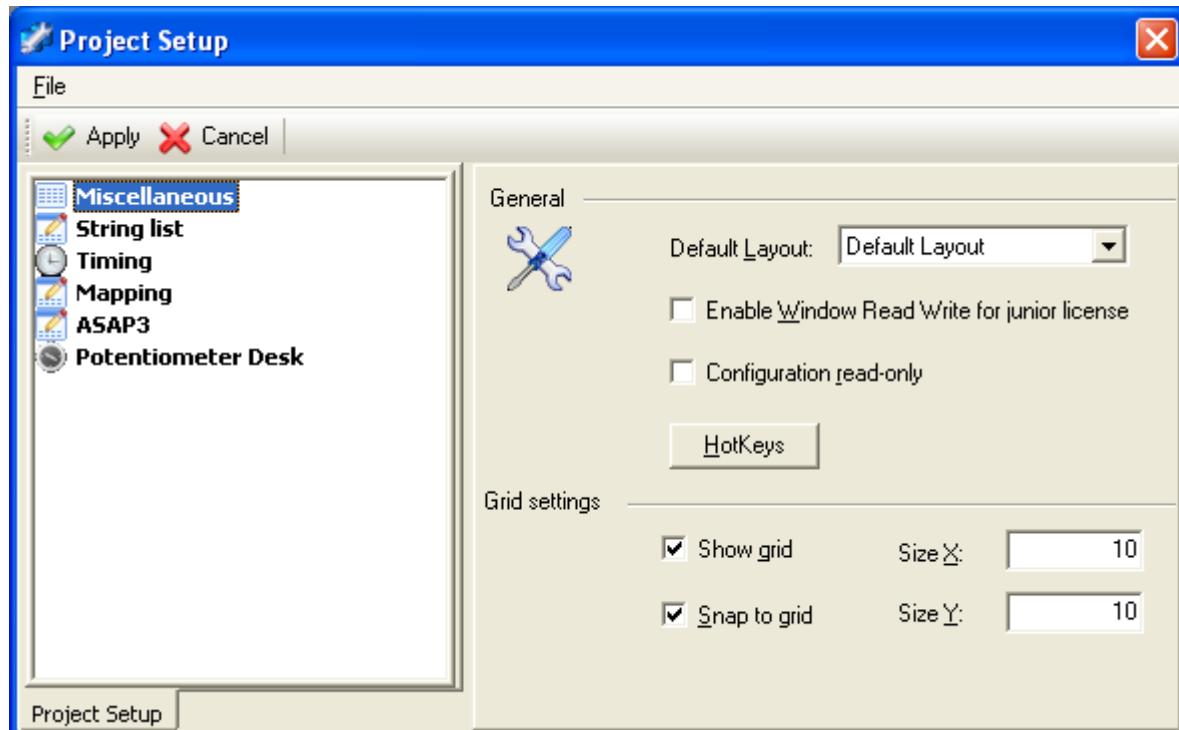
 : moves selected items down in the list.

# Project Setup

Settings described in this chapter are related to the ECU but are saved in the project's data configuration.

Run *Project Setup...* command in main *File* menu to open the *Project Setup* window.

## Miscellaneous



Miscellaneous page has two main sections for setting generic aspects for project: **General** and **Grid settings**.

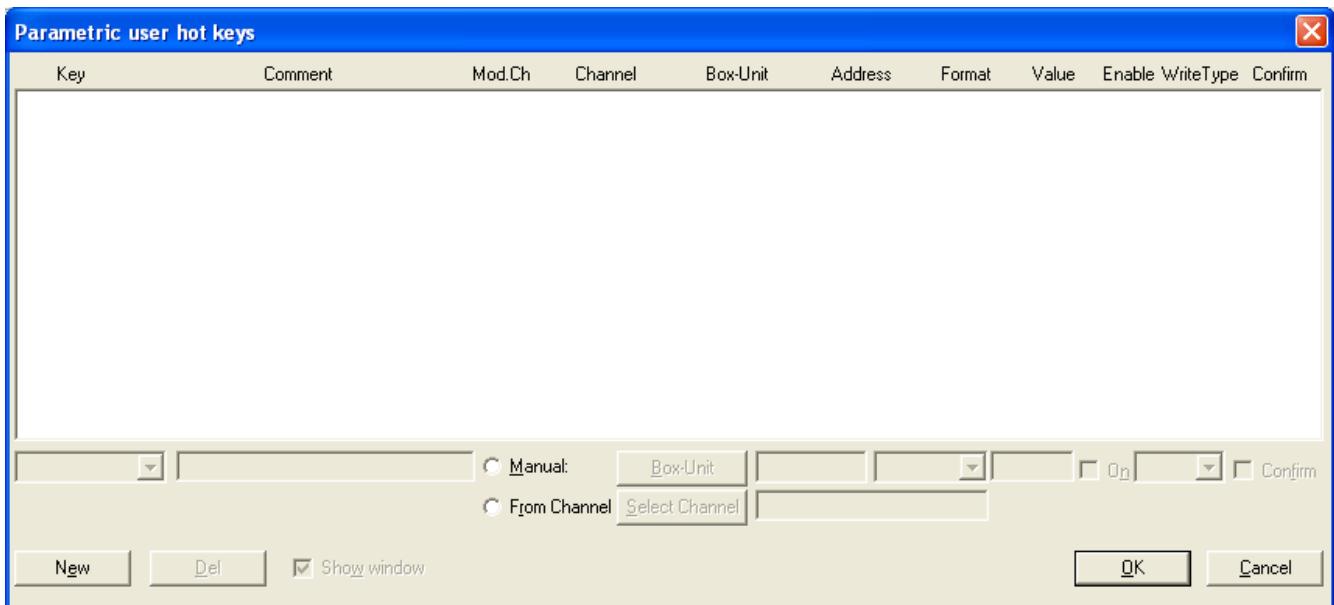
Fields in **General** section are described below.

**Default Layout:** You may select the name of the Layout that will be the first one opened when the project is loaded.

**Enable Window Read Write for junior license:** this option allows junior licenses to use Read Write window.

**Configuration read-only:** this option sets read-only status for the project, so that elements in the project can't be modified (including analysis windows, layouts, and other settings).

**Hotkeys:** this button opens the Parametric user hot keys window, where user can customize hot keys.



You may reserve a few keys on the personal computer to send a value to a specific address of one ECU from the electronic device. This to increase speed, for repetitive tasks or to switch operating modes.

You can define the address, the value and the destination ECU in the project file. Each hot key can be individually set: activated or not, write the value a single time or in *repeat mode*, and require or not a confirmation before actually writing the data.

Available programmable keys can be selected in the combo box under Key column.

Once the programmable key associated command is executed, a feed-back message is displayed in the status bar (in green if all is OK, or in red if something went wrong). If the option Make Log File is active, a HOTKEYS.LOG file is created (in the directory where SYSMA resides), and it keeps track of all the programmable keys operations.

If the Window Information option is activated (flag Show), the list of hotkeys used appears in that window. It can be especially useful to follow the hot keys in "repeat" mode [to stop the repeat sequence, use Alt+End (it works even if the info. Window is not opened)].

When defining the hot keys, it is possible to associate several different writing commands to the same hot key. For hot keys with confirmation, a small window describing the command about to be executed appears, and a waits for validation (for hot keys in "repeat mode" as well, this confirmation is only asked once). For hot keys without confirmation, the small window appears just for one second, giving information on the command being executed (comment and type of repetition used).

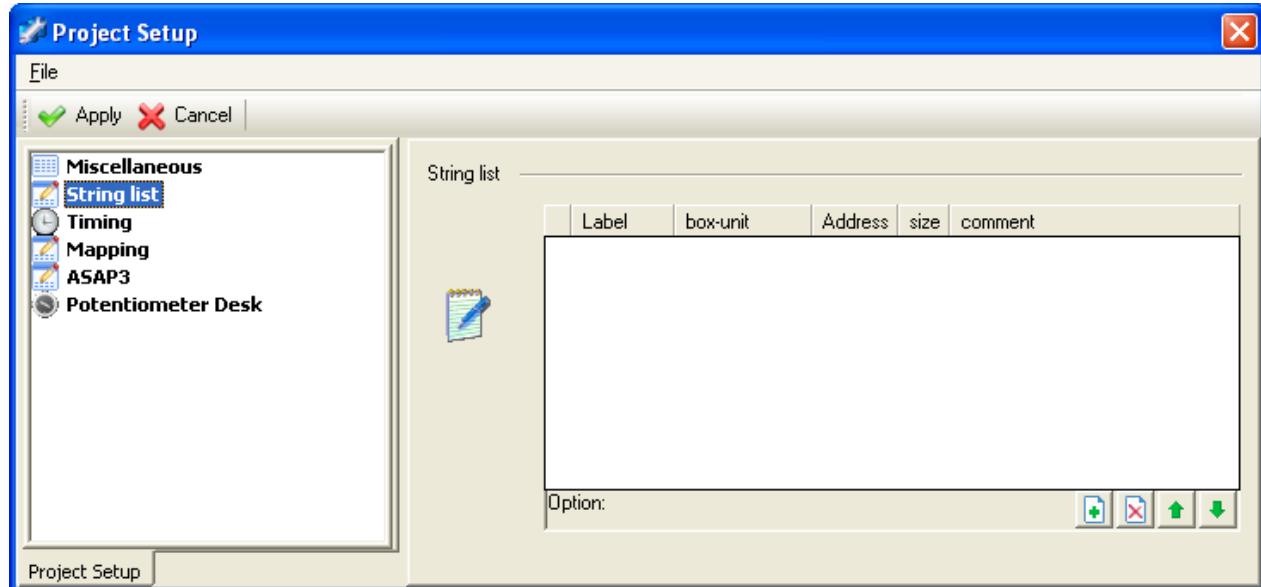
Options and configuration in **Grid settings** section apply to Instrument windows.

**Show grid:** this option allows to show or hide grids in Instrument windows.

**Snap to grid:** this option allows to snap graphic items to grid frame, when they are moved in the Instrument window.

**Size X and Size Y:** insert numeric values to define distance between each Horizontal and Vertical grid marker.

## String list

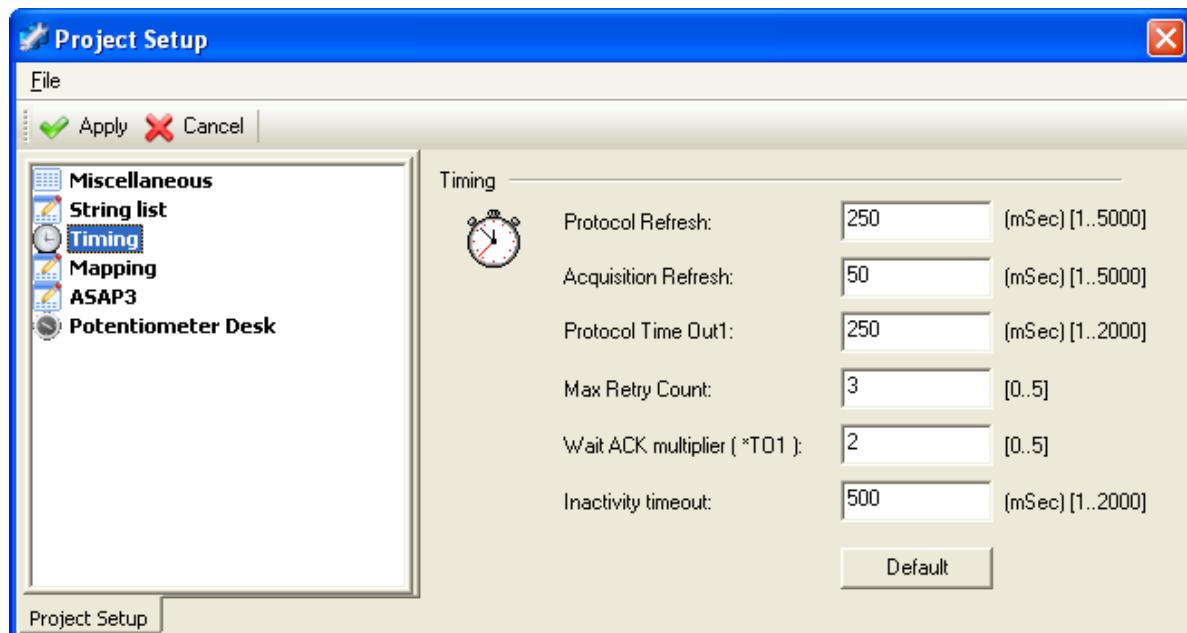


Opens a panel for configuring the character strings to be read in the electronic unit when the *Unit Release* function is called.

Displays a certain number of strings read from the electronic unit in ASCII format. These strings may have been written by transmitting a Calibration file, or may exist in the electronic unit code.

The panel displays the list of strings created and configured. You must enter the destination box-unit, the address and the size of the string to read, in bytes.

## Timing



**Protocol Refresh:** The maximum time allowed for each data read and screen refresh cycle. Too large a value makes the display too slow, while too small a value cannot be applied if it overloads the electronic unit (frame too large). There is also a risk that the PC cannot refresh its graphics fast enough. Start with a low value, and increase it progressively. (For example: 100 to 250 ms).

**Acquisition Refresh:** It's the refresh time of the data acquisition process of the Oscilloscope window.

**Protocol Time Out1:** Maximum wait time for a basic task before performing a retry. If this value is too low, frequent communications errors may occur depending on the load of the connected electronic unit.

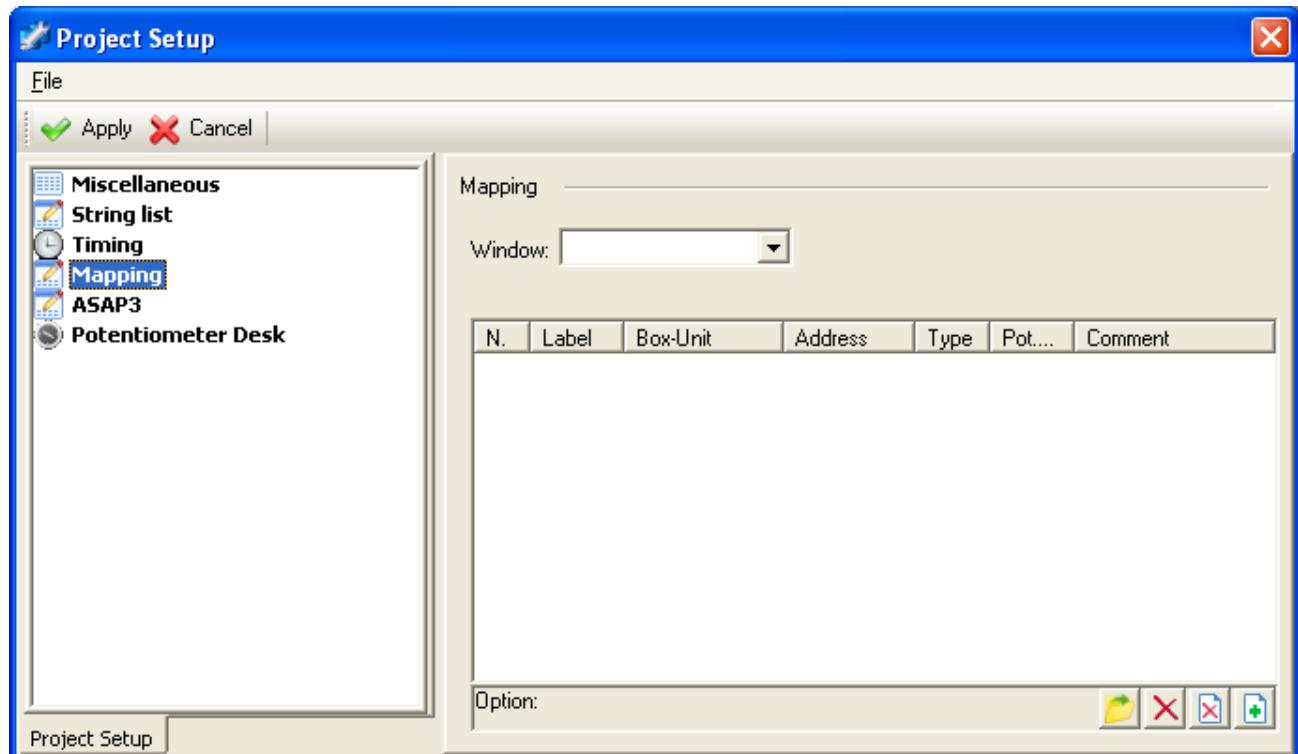
**Max Retry Count:** This is the maximum number of retries for an unsuccessful command before completely resetting communications.

**Wait ACK multiplier (\*TO1):** This is a multiplier of "Protocol Time Out1" used to prolong the wait time if the electronic unit has not finished its basic task, but signaled the PC with a "Wait ACK" message (writing to E2PROM, internal transfer between processors, etc.).

**Inactivity Timeout:** This is the maximum period of silence on the line. Beyond this time, the system supposes the electronic unit has stopped and resets communications.

**Default Button:** Restores a set of commonly used values that enable correct operations on most systems.

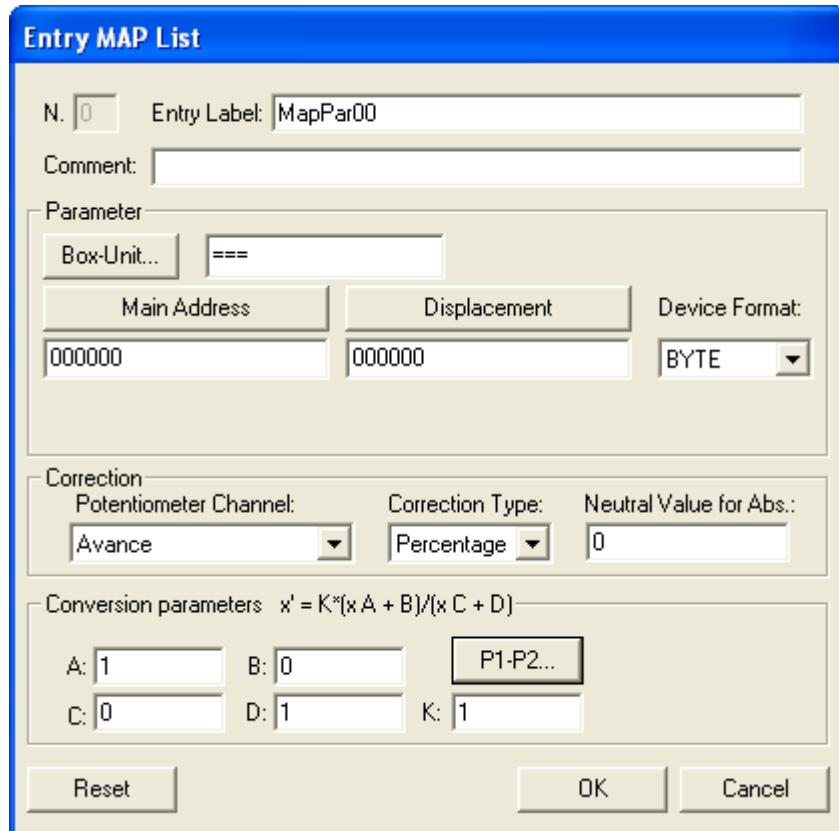
## Mapping



The mapping functions let you directly write potentiometer corrections to the calibrations contained in the electronic unit. This requires a Potentiometer window to which the mapping functions will be attached.

**Window:** select the Potentiometer window that will be linked to mapping functions.

In the list can be configured potentiometer items that belong to the selected windows. Double click on single item opens *Entry MAP List* window to configure detailed settings.



In the header area of the window, edit a string to identify the mapping item and an associated command. Progressive number for mapping item is also displayed.

In *Parameter* section configure reference to ECU calibration area.

**Box-Unit:** this button opens a window for selecting a box-unit on the ECU. User can also digit the name for the box-unit in the field on the right.

**Main Address:** this button gives focus to *Channel Browser* environment, and allows to select a channel; the value assumed by the channel will be used as starting main address for mapping calibration table area on the ECU. Reference to *Main Address* can also be edited manually.

**Displacement:** this button gives focus to *Channel Browser* environment, and allows to select a channel; the value assumed by the channel will be used as offset to the starting main address for mapping calibration table area on the ECU. Reference to *Displacement* can also be edited manually.

**Device Format:** select data type format on device for mapping calibration table area on the ECU.

In *Correction* section configure options used to modify Potentiometer channel values before sending them to ECU for mapping management.

**Potentiometer Channel:** select a channel from reference Instrument window.

**Correction Type:** select a correction to apply to potentiometer channel values among *Percentage*, *Additive*, *Absolute*.

**Neutral Value for Abs.:** numerical value used for *Absolute Correction Type*.

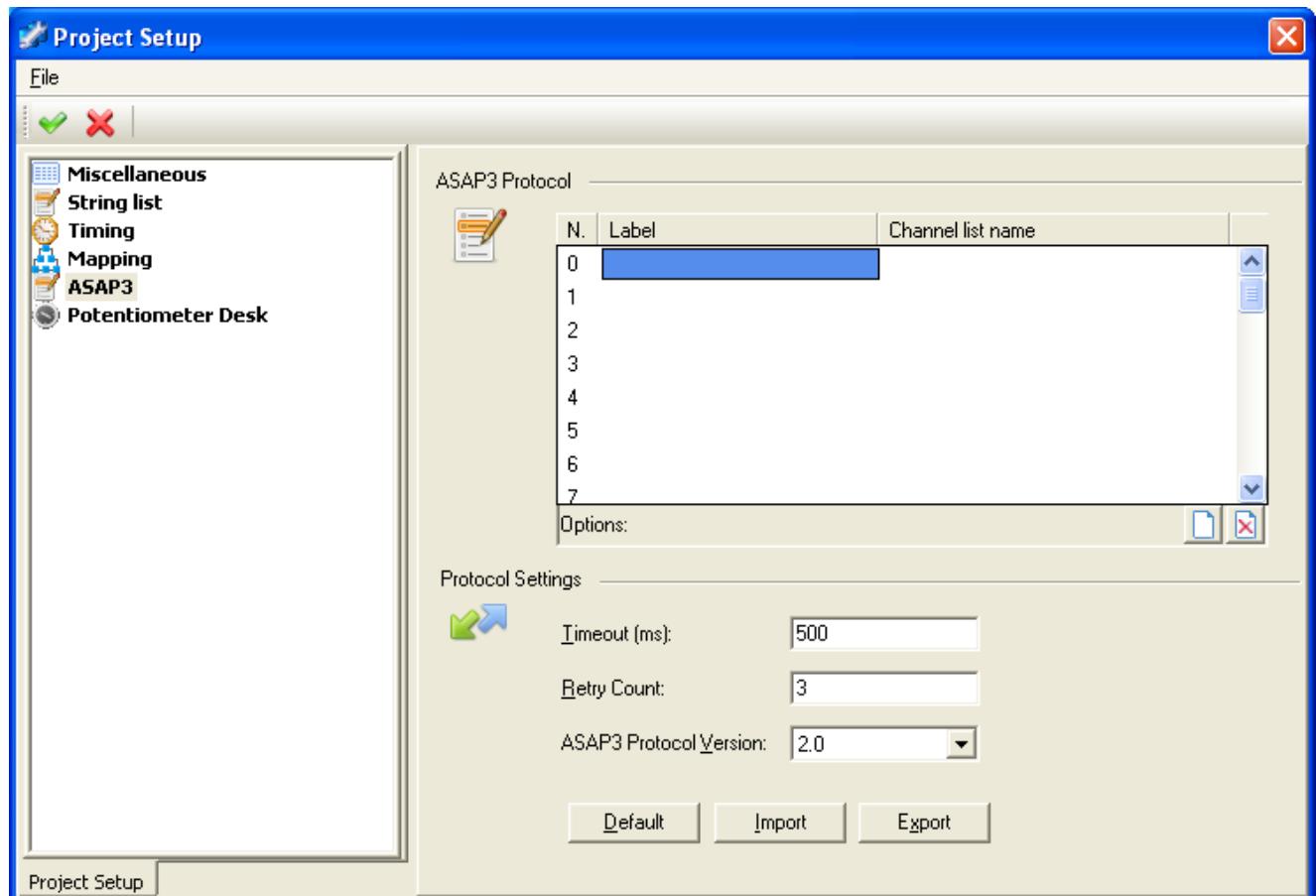
In *Conversion parameters* section configure parameters for engineering conversion to be applied to potentiometer channel values before sending them to ECU calibration table area.

**P1-P2...** button opens a window to calculate automatically parameters using two entry points.

**Reset** button resets settings in the window to default.

For more details on Mapping function see chapter **ECU / Calibrations / Mapping** in this manual.

## ASAP3



The dynamometric bench acquisition system can request data from SYSMA (up to 40 channels). A table (saved as an .AVL file) is created to associate each channel of the dynamometric bench with a channel from the CLX.

SYSMA allows you to send data to a dynamometric bench data acquisition system using the ASAP3 protocol. You define the channels to read in the electronic device. These are sent to the dynamometric bench in converted format at each refresh cycle. You must tell to SYSMA the name to associate with the channel so it may be recognized by the bench's data acquisition system. The system can be activated only if the parameters are correctly programmed.

**Note for the serial port:**

- You must use a dedicated serial port. We suggest you configure a different interrupt level for each serial port. For example:
  - COM1, IRQ4, 19200 link with the electronic device
  - COM2, IRQ3, 9600 link with the dynamometric bench
  - COM3, IRQ5, 9600 link with external potentiometers

**Note for the Ethernet port:**

- You must configure Local IP Address and Port in General Options – Protocol. The implementation does use TCP/IP sockets for communication. SYSMA works as a server, it listens at a specific IP address and port number for incoming connection requests.

Connection with the dynamometric device may be stopped (the *Asap3 Protocol Start* icon is red) or active (the *Asap3 Protocol Start* icon is green). The *Tools/General Options/ Protocol/Asap3 Enabled* may start communications automatically.

When the *Asap3 Protocol* protocol starts, the device sends to SYSMA a list of channels to be sent. SYSMA then compares this list with the table, and authorizes the start of data transmission (the negotiation phase between the two systems may require up to forty seconds).

ASAP3 Protocol Version 2.0 allows the dynamometric bench to read and write calibration data from the ECU. The tables are referenced by Display Name, so you have to properly configure the dynamometric bench according to the names of the calibrations of the CLX set in use.

**Label:** Name of the channel as recognized by the dynamometric bench acquisition system.

**Channel list name:** Channel from the channel list.

This button modifies the 40 possible channels. It opens a panel for configuring the channel of the dynamometric bench system and for assigning a channel from the channel list. Equivalent to double-clicking on the channel.

**Timeout (ms):** Specifies the amount of time the protocol waits during communications with the dynamometric bench. Too long a time may interfere with the dialog with the electronic unit, while too short a time may inhibit communications with the dynamometric bench.

**Retry Count:** Specifies the maximum number of retries before switching to other tasks.

**ASAP3 Protocol Version:** Specifies the version for the ASAP3 Protocol to use.  
Default 2.0

**Default:** Sets the properties to their default values.

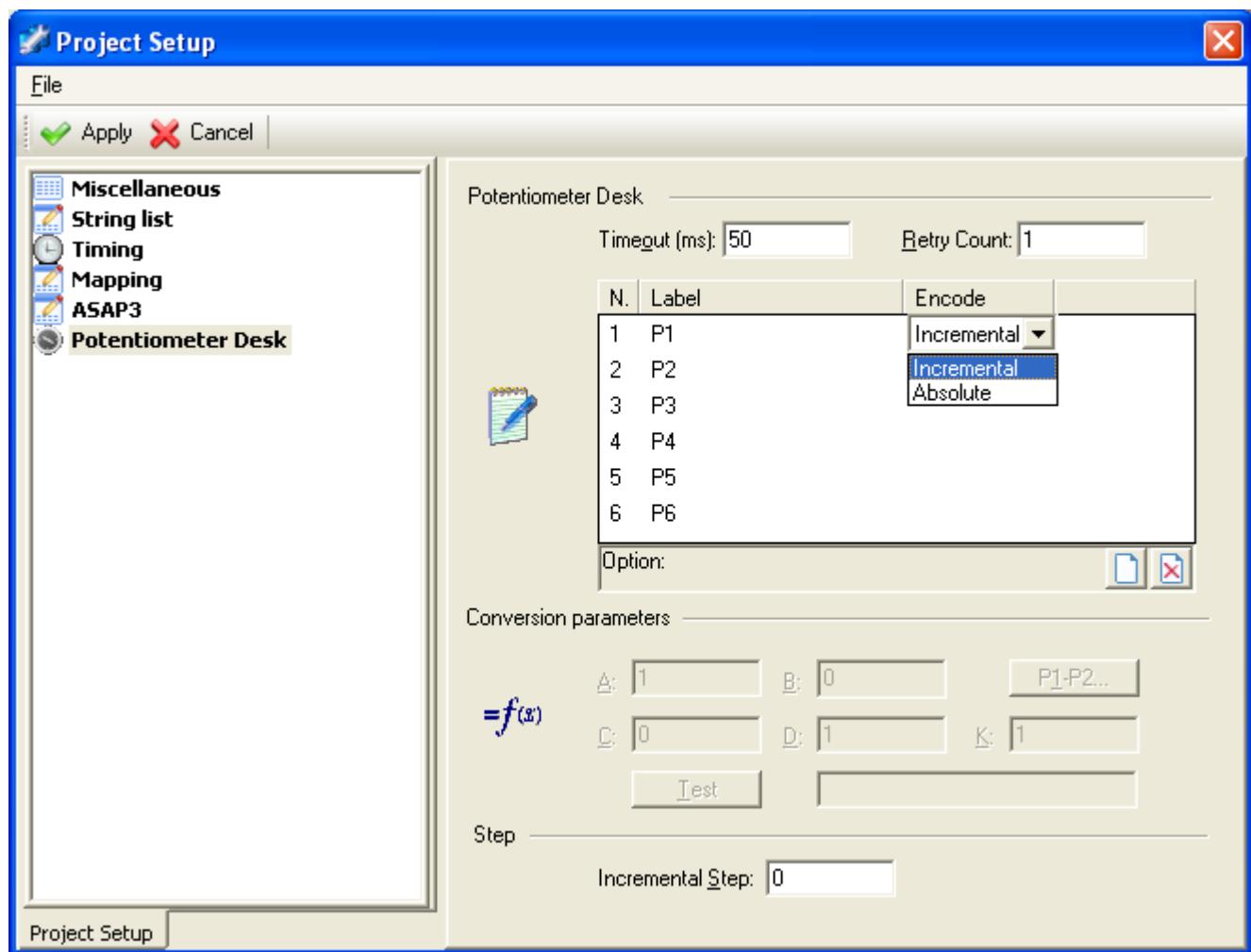
**Import and Export:** Use of the *Import* and *Export* buttons allow you to manage a file with extension .DYN.

## Potentiometer Desk

This panel lets you configure the functions associated with the external potentiometer desk. It is connected to the PC through a serial line, and lets you modify certain operating parameters using rotary dials. The results are identical to using the fields in a potentiometer window, but this is much faster to adjust because it does not require you to use the keyboard. The data from the potentiometer desk is sent to the "new value" field of a potentiometer channel from the channel list.

The potentiometer desk (AMC6 with 6 potentiometers) is connected either on a second serial port or on the main link between the ECU and the PC.

The value received by the desk is stored in one byte (0 - 255). First this value is converted to adjust the sensitivity of the rotary dial. The result is then written to the new value field. The data sent to the electronic unit will undergo the reverse transformation of the linearization of the channel in the channel list (or locally if the parameters are replaced by a field in the window).



Global authorization for external potentiometers is performed through SYSMA in the preferences file.

**Timeout (ms):** time out for attempts to connect with the potentiometer desk (100 ms recommended).

**Retry Count:** Number of times each command is attempted before reset.

**Encode:** Selects the protocol potentiometer desk in use.

**Potentiometer Channel (P1, P2, P3, P4, P5, P6):** Names of the channels associated with the various rotary dials on the external desk.

This icon displays the channel list for selecting a channel associated with the currently selected dial.

**Conversion Parameters:** Displays the configuration panel for converting between the currently selected external potentiometer and the selected channel (the value between 0 and 255 from the pot. desk is converted into the appropriate value to write in the channel).

**Incremental Step:** Defines the value for the incremental Step to be used.

## Communication with the ECU

This paragraph describes all the operations required to communicate with the ECU device.

Note that SYSMA provides two distinct connection modes:

- **Control** connection allows to manage Calibrations (sending and receiving Calibrations from the device), Read and Write values for parameters in specific memory areas of the device, and other functions usually available on devices used to handle engine control units.
- **Logging** connection allows programming the device with Logging Channels table, managing logging features as Trigger conditions and Zeros, read actual values for logging channels, and other functions usually available on devices used to handle acquisition for telemetry data.

The availability of the connection type (*Control* and *Logging*) for each device depends on the file system Device Description file (.DEV), which is loaded into the project and associated with the device itself.

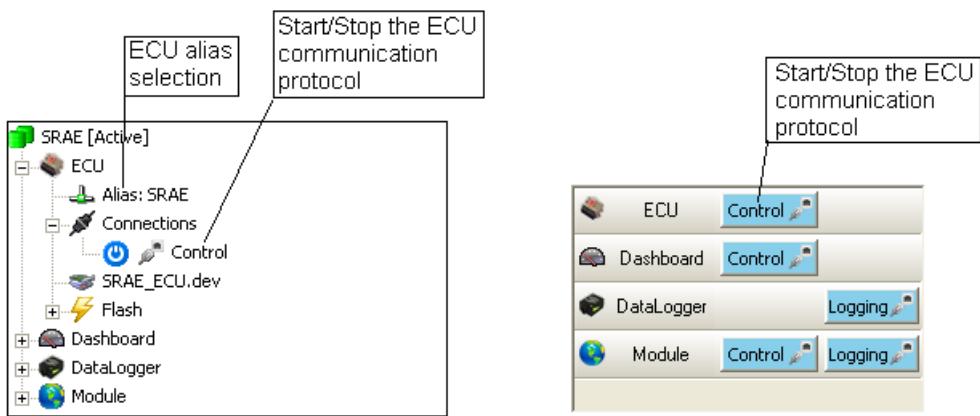
This chapter focuses on the first connection mode: **Control**.

### ECU Communication Start/Stop

In order to manage the communication protocol with the electronic device, use interface controls in *Project Workspace* and *Connection Status* environments. These toolbar windows can be opened from *View* menu.

After having loaded a project, the user must select the destination *alias* in ECU item in the *Project Workspace* interface (if using an Ethernet or CAN card). By default SYSMA initiates the protocol using the last alias used.

By pressing the Start/Stop Control icon SYSMA attempts to start a communication session with the electronic device. The same command can be performed using Control button for ECU item in *Connection Status* interface.



When the connection is off, the icon is displayed in blue; it becomes red when trying to connect to the boxes (or the connection is lost and is retrying) and is green only if all boxes requested are connected.

- Connection OFF
- Connection ON - Established
- Connection trying

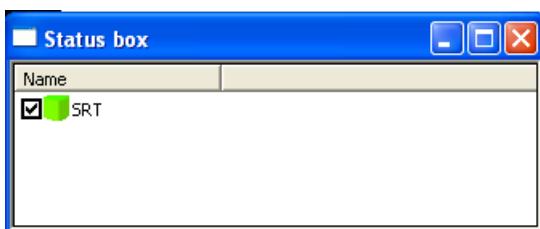
Communications are possible if the line port is configured correctly (the settings are provided in the Device Description (.DEV) file on the selected device). If the settings are correct (Serial/CAN/ETH port, StepX or MTP protocol, baud rate equivalent to that of the electronic device), and of course if the electronic device is connected and powered on, then the protocol starts. A warning window may appear giving some help about protocols errors. (e.g. if CAN ID are not correctly defined in the file Device Description (.DEV) for this PC-Number).

## Status Box window

This window provides a graphical overview of the connection status to the boxes.

In multibox environment it's possible to quickly check the connection status of each box. Icons are blue when SYMSA stops the protocol, red when trying to connect and green when connected.

All boxes defined in the system file Device Description (.DEV) are in the Status Box window.



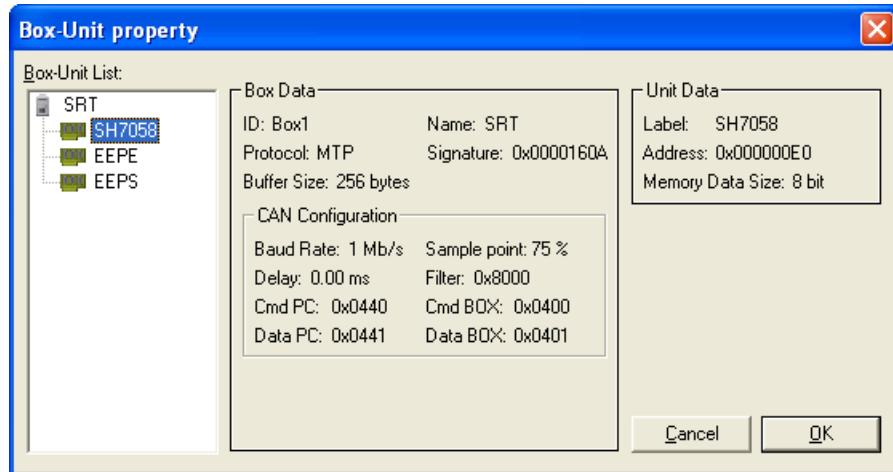
Color legend:

- SRT Connection OFF
- SRT Connection ON - Established
- SRT Connection trying

# ECU Information

The information commands are available in the menu *ECU/ECU Info* and allow to collect information about the connected hardware.

## Box-Unit



This list gives information about all ECU's available on the system. Each ECU is one "Unit" (Processor or E2PROM) found in one "box".

This information are found in the system file .DEV associated with the configuration ECU device in the project, they are necessary for SYSMA to know the protocol parameters allowing the communication with the ECUs.

Box-Unit List	List of Box_Unit couples available.
Box Data	Protocol (MTP or StepX) used to access the selected Box.
CAN Config	CAN parameters:  Delay, Baud Rate and Sample point give the hardware configuration used according to the parameters in the .DEV file.  Filter is the packet filtering for the PCMCIA-CAN card. (Computed automatically in SYSMA according to the PC-Number and the subsequent CAN-ID used).
Unit Data	Unit access parameters inside box.

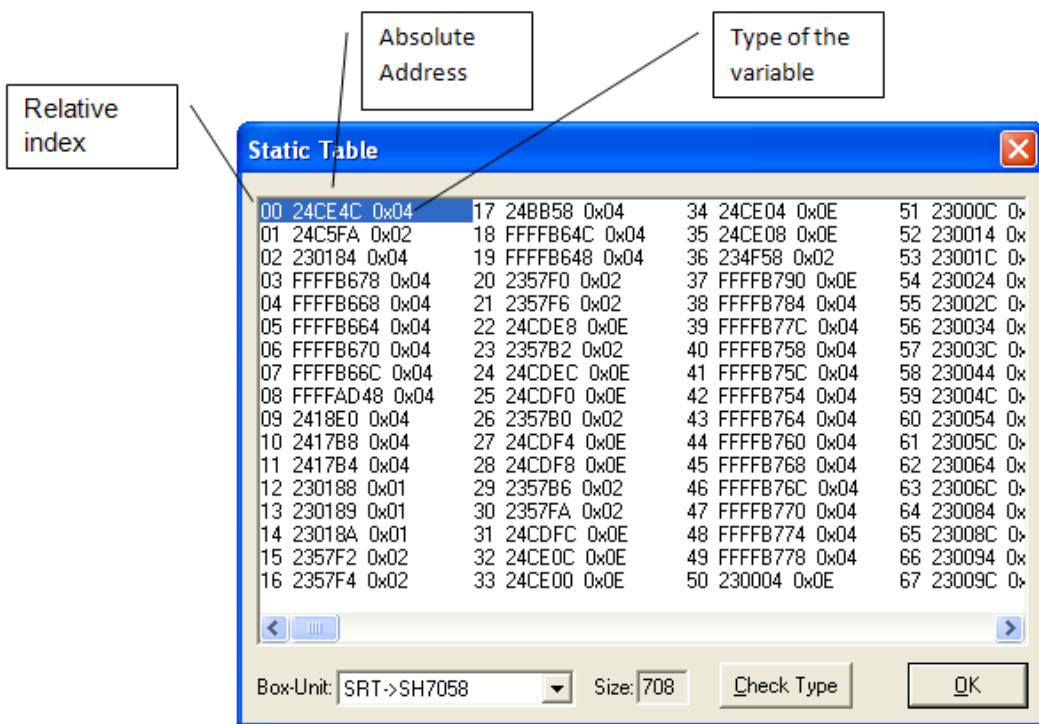
Note: In SYSMA the line to be used (CAN,COM,ETH) to communicate with the devices can be set in the menu *Tools/General Options* in the section "Protocol".

## Static Table

Gives the list of addresses in the static table of each Box/Unit. This list allows SYSMA to resolve the effective address of channels defined in the channel list as "relative" channels. With each address SYSMA receives the type of the variable as defined in the ECU software. By clicking on the "Check Type" button SYSMA may perform a check between the ECU type and the type defined in CLX.

Legal types are:

Code hex	Type	Length in byte, automatic value	Comment
1	BYTE	1	Byte
2	WORD	2	Word
4	DWORD	4	Dword
81	SBYTE	1	Signed byte
82	SWORD	2	Signed word
84	SDWORD	4	Signed dword
E	FLOAT3	4	Floating point IEEE 32 bit
F	FLOATX	4	Floating point Texas 32 bit



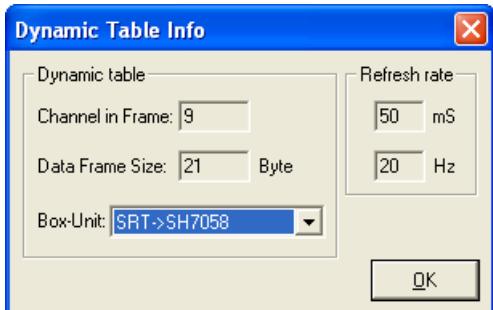
The *Check Type* button displays the following window displaying the differences between the types defined in the CLX and the types defined in the static table:

**Check Type Results**

Type specified in				Close
Channel	Box-Unit	Static Idx	Static Table	Channel List
FCT_RFD	SRT->SH7058	507	DWORD	BYTE
PotPH1	SRT->SH7058	158	BYTE	SBYTE
PotPH2	SRT->SH7058	159	BYTE	SBYTE
PotRA	SRT->SH7058	160	BYTE	SBYTE
TI_Water	SRT->SH7058	282	DWORD	WORD
KaPBaroGain_CL_N	SRT->SH7058	546	DWORD	SWORD
KaPBaroGain_CL_P	SRT->SH7058	547	DWORD	SWORD

## Dynamic Table

This command allows to get information about the protocol load: total number of channels and equivalent value in bytes, to be refreshed from each box for the current displayed windows.



## Dynamometric Bench

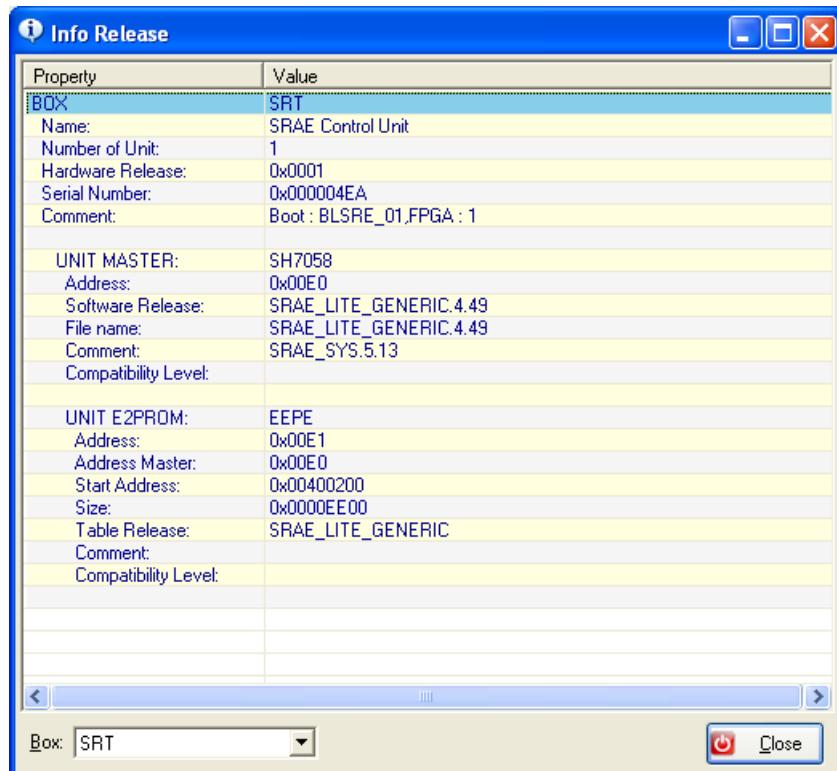
Gives information on how the protocol ASAP has solved the list of channel to be sent to the dynamometric bench system.

## String List

This window allows you to display character strings in ASCII format. These strings are read at any address, and may be programmed from the various microprocessors contained in the Box/unit list.

Use the *ECU/ECU Info/String List* menu command.

## Unit Release



When the connection to a box is established, SYSMA requests a "release structure info" from the box. This window gives the result of that request; this includes general box information and particular unit information.

**UNIT MASTER:** gives particular information about each processor (Sub address in box, Software release, Symbolic file). These kinds of information are used in read/write window for the symbolic mode.

**UNIT E2PROM:** gives particular information about E2PROM eventually attached to a processor (sub address in box, attachment processor, start address and size). This information is necessary to load/save E2PROM file \*.TAB and to redirect E2PROM channels to the attached processor.

# Calibrations

SYSMA allows you to work on partial areas of memory. You may receive, modify, send, compare or print areas in the electronic device, located either sequentially or separately in memory. SYSMA allows you to edit these areas using one or more database files that contain the scale and display coefficients along with the data itself.

SYSMA can verify automatically that the data has been written correctly by rereading the destination area and comparing. Select the *Write calibration verify* option in the *Tools/General Options/Calibration/Calibration protocols*.

SYSMA displays calibration data in specific windows in the layout, for editing the numerical values and table parameters:

- alphanumeric window type Edit Table,
- graphics window type 2D and 3D.

Edit Table window can be opened selecting calibration channels (Calibration Tables or SYM Calibration Tables) in Channel Browser environment or in SYSMA Database CLX window.

Commands in ECU/Calibration menu allow to perform operations on calibrations and Edit Table windows: open graphics window 2D and 3D, Read and Write data from and to ECU, importing and exporting data values in Excel or CSV format, manage Tables protection, use mapping feature.

## Edit Table, alphanumeric window

The screenshot shows the 'Edit Table' window with the following details:

**Table Title:** Table [Advance\_During\_Start\_Bangbang\_f\_rpm\_p2\_]

**Display Name:** Advance\_During\_Start\_Bangbang\_f\_rpm\_p2\_

**Ref. Name:** EE.Tbo.tab\_AvBangDep

**Box-Unit:** SRT->EEPE

**Comment:** Ignition advance applied during start bangbang as a function of engine speed and boost pressure.  
This advance is signed and may vary from -63 to +63° Crank, and is not corrected as per the nominal advance.

**Data Grid:**

1,1,1	3000	3500	4000	4500	5000	5500	6000	6500
01.0	017.0	017.0	018.0	020.0	010.0	010.0	008.0	008.0
01.5	015.0	015.0	016.0	016.0	016.0	015.0	008.0	008.0
02.0	015.0	015.0	016.0	016.0	012.0	009.0	009.0	009.0
02.5	012.0	012.0	014.0	014.0	015.0	009.0	009.0	009.0
03.0	010.0	010.0	010.0	012.0	009.0	009.0	009.0	009.0

You may access the general SYSMA commands from the Edit Table window. You may use the window in a generic fashion just like the other windows, with its own title bar and function keys.

The values in the table are displayed in the alphanumeric window, organized in rows and columns. If the table has three-dimensions, you may change the data displayed along the Z-axis. If the table is too large to be displayed in a single screen, two scroll bars are displayed allowing you to move around the table. The intersection of the indices indicates the work point.

The reference values for the axes are displayed at the top left. These are either the break points if they have been defined, or increasing numbers between parentheses where (1),(1) represents the cell at the top left. General information on the table is displayed above the table to the left, and operational information is displayed on the right. To display a one-dimensional graphical image of the current row or column, use the ECU / Calibration / Graph Row/Col menu command. Use the menu bar or the hot keys to manipulate single values or a set of values. The Step-Control interface window (Ctrl+right button click on a value in the table, or use command Control Step Editor in both ECU/Calibration main menu and popup menu) can be helpful.

You may display the table properties panel by pressing F4 or by double-clicking on the general information.

Several features relative to the window can be accessed by toolbars ECU and ECU Hotkeys

### **Interpolation**

It performs a linear interpolation on the selected values. The intermediate values are updated using a row, column or block interpolation. Row interpolation uses the values of the first and last line; and Column interpolation uses the values of the first and last column.

### **Read Table**

It performs a linear interpolation on the selected values. The intermediate values are updated using a row, column or block interpolation. Row interpolation uses the values of the first and last line; and Column interpolation uses the values of the first and last column.

### **Write Table**

Writes data to the electronic device at the tables absolute address. The system requests confirmation before writing. This key is disabled if there is no communication with the box or if the table transmission is not enabled (see properties, enable flag).

### **Show/Hide Info**

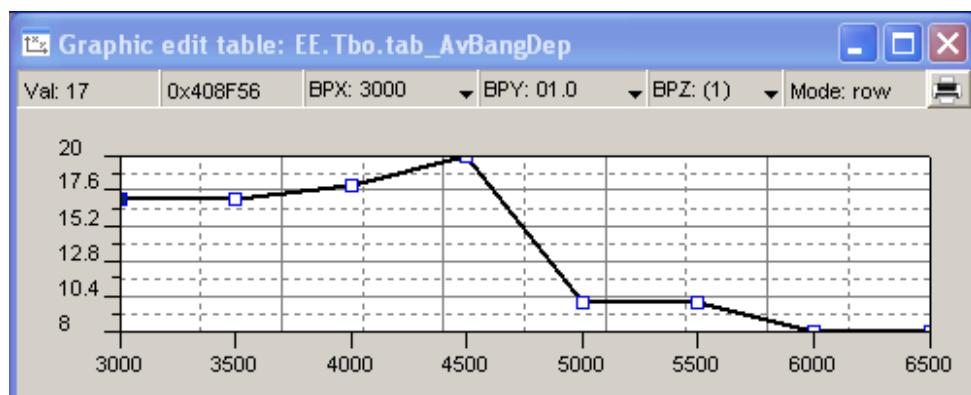
Displays information about the current field:

Header shows or hide header area information.

Value diff. shows or hides Difference between the 2 values

Comment shows or hides calibration comment.

### **Graphic window 2D**



You may display the data from one row or on column graphically. The numerical table and the graph are linked. By default the graph is not activated.

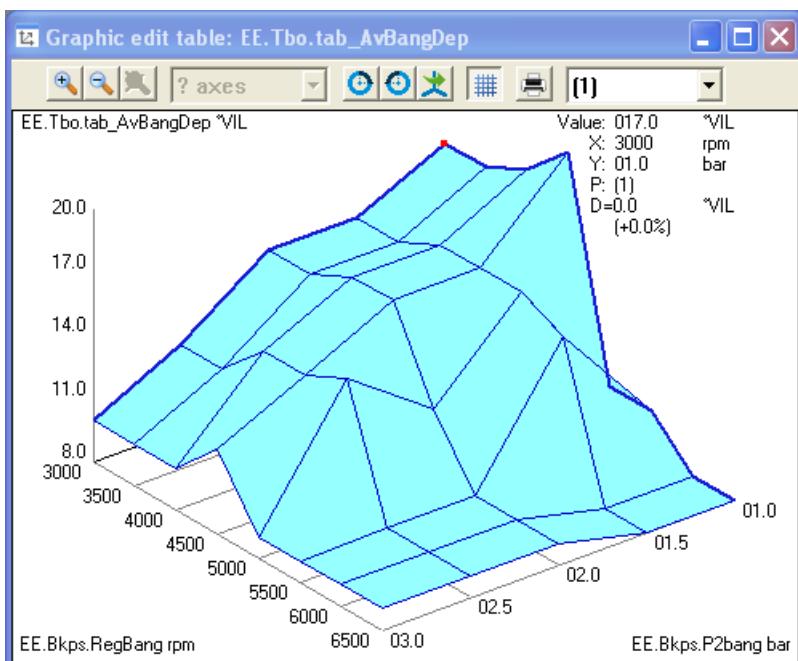
For two-dimensional tables, if one row or column is not selected, the program prompts you to choose either a row or column to plot.

Values that are modified change colour at the same time in both display windows. You may perform the same operations in both modes. Selecting all the points in a graphics window is similar to a selection in the numerical window.

Some operations are more complete in graphics mode: when a selected zone is moved, the segments form is maintained. If one of the points on the segment becomes saturated, any change that attempts to modify the segments form is prohibited.

A "printer" icon allows to print the current graph.

## Graphic window 3D



This window offers a 3D representation of a two dimensions map. To open this 3D editor, use : *ECU/Calibration/3D Graph mode* and to quit, press *Esc*.

The cursors position is represented by a red dot at the crossing of two yellow lines. The cursor in the alphanumerical window follows the cursors position in the 3D window. It is possible to select a rectangular area with the mouse right button, and apply a value modification by:

- typing a value that fills in the zone
- applying steps with the shortcut *Ctrl + Arrows*.

## Function Keys Bar



<b>Zoom In</b>	Self explanatory
<b>Zoom Out</b>	Self explanatory
<b>Restore View</b>	Cancels the zooming effects
<b>Axes for Rotation</b>	Selects the axes for rotation
<b>Rotate Left</b>	Self explanatory
<b>Rotate Right</b>	Self explanatory
<b>Index Invert</b>	Swaps the breakpoints axis to revert the view
<b>Grid Filled</b>	Selects the aspect of the graph (filled surfaces or transparent grid)
<b>Print Graph</b>	Self explanatory
<b>Select Plane</b>	Enables to select another layer in the Z-axis for three dimensions tables.

## Tables Protection

Table protection allows to crypt values for calibration channels on electronic device. When a calibration table is encrypted, user needs to decrypt values read from electronic device with a given password, and display correct values on SYSMA interface windows.

Select *Protect* field on in *Calibration Properties General* page for enabling protection management on a calibration channel.

Commands for encrypt and decrypt calibration values on electronic device are in menu *ECU/Calibration*.

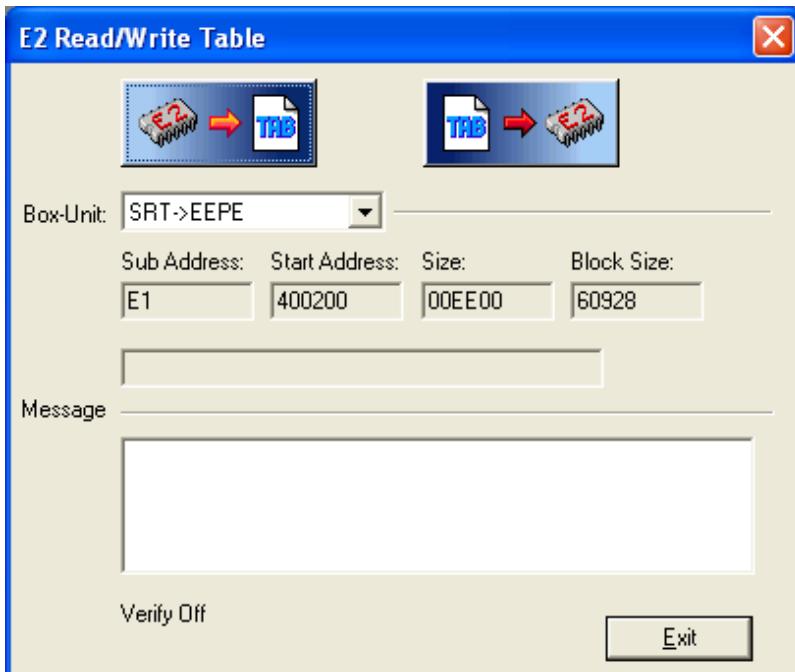
- **Encrypt Protected Tables:** crypts on ECU calibrations with *Protect* field enabled. User has to insert a password in Hexadecimal format.
- **Decrypt Protected Tables:** decrypts protected calibrations on ECU. User is asked to insert a password.
- **Erase Encrypted Tables:** removes protection management for all protected tables and set decrypted status on electronic device. After this command, user needs to send to the ECU all the calibrations to protect and run *Encrypt Protect Tables* command, if he wants to protect calibrations.

## Upload/Download Calibration Data

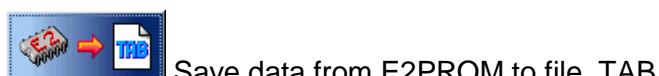
SYSMA can read and write the full contents of the electronic devices E2PROM to and from \*.TAB files.

SYSMA can automatically verify the correct programming of the E2PROM by rereading the data for comparison. Select the *Write E2 verify* option in the *Tools/General Options/Calibration*.

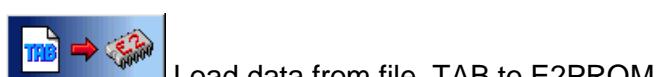
Use the following command *ECU/Calibration/Upload/Download Calibration Data* to call the menu.



Select the Box-Unit to work with, then perform a *Save*, *Load* operation. Activate icon with mouse or select with TAB then space bar.



Save data from E2PROM to file .TAB



Load data from file .TAB to E2PROM

The Save and Load icons call file selection panels to create or send a .TAB file, after confirmation. By default SYSMA treats only file .TAB with specific extension: name\_Box\_Unit.TAB

Examples: E2PROM table "tst3241" from Box "ENG10" Unit "EEPE" will be saved under the name tst3241\_ENG10\_EEPE.TAB; at the opening of the selection panel for a *Load* operation, SYSMA will show only files with extension \_ENG10\_EEPE.TAB.

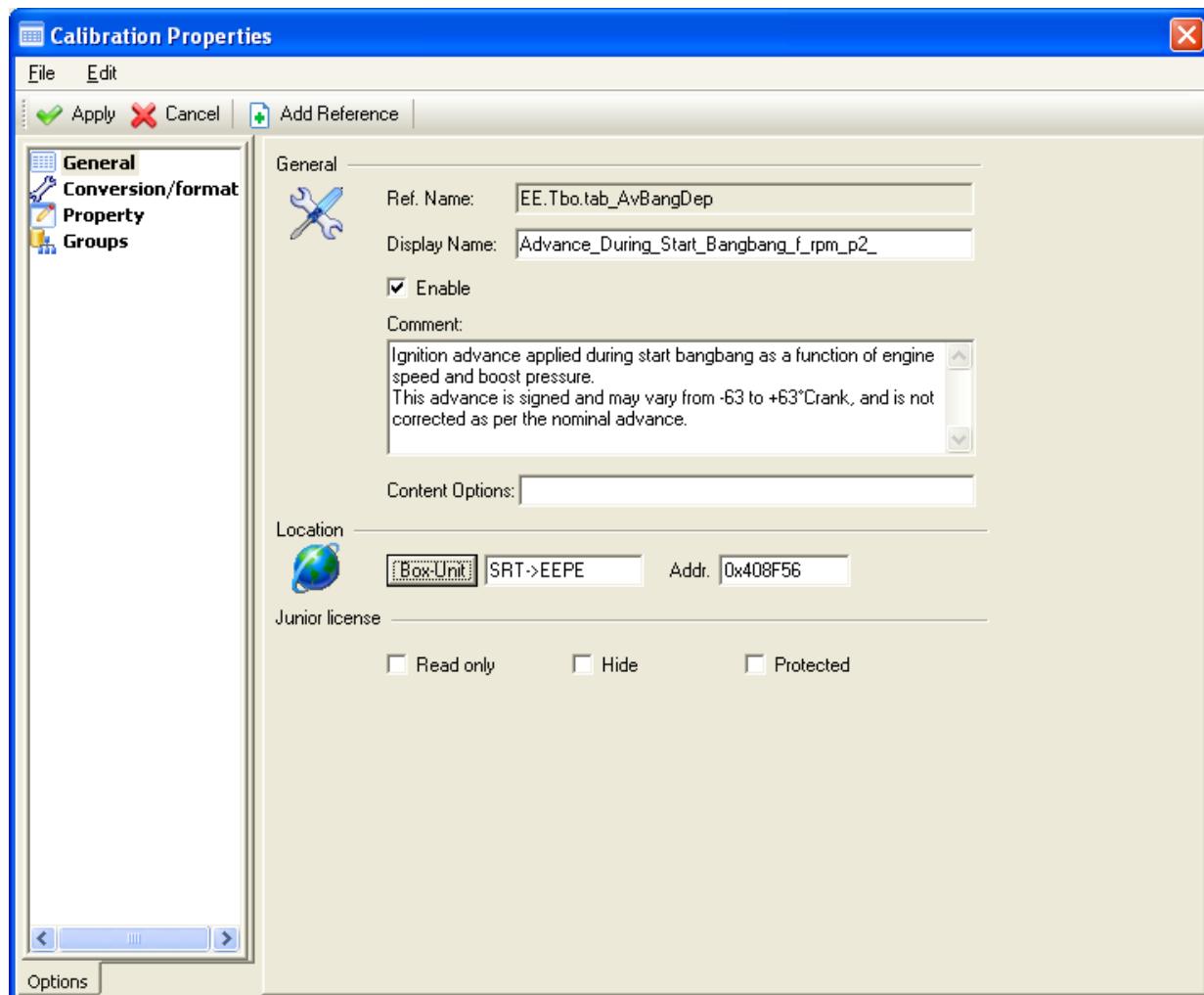
The Sub Addr, Start Addr, Size and Block Size give information about the E2PROM access.

The electronic device gives these kinds of information to SYSMA.

Sub Addr.	Destination sub address for the data transfer.
Start Addr (hex)	Base address in the ECU mapping.
Size (hex)	E2PROM image .TAB size to be transferred. The maximum size for .TAB file is 256 Kbyte (Size 0x40000).
Block Size (dec)	<b>STEPx protocol:</b> The system file Device Description (.DEV) sets the <i>E2_Page_Size</i> parameter that indicates the size of the E2PROM page for fast writes (block writes). This depends on the hardware of the electronic device, and is equal to either 32,64 or 128 (default is 64). Improper configuration of this parameter may prevent writing to the E2PROM.
STEPx: E2_Page_Size	<b>MTP protocol:</b> The E2 page size is known from the electronic device and such parameter has not to be known by SYSMA. SYSMA works on a single block equal to size.
MTP: E2_Size	

## Calibration Properties

### General



**Ref. Name:** identifies the calibration channel software name. All calibrations Reference Names must be different for the current database loaded (considering all the CLX files in the project).

**Display Name:** identifies the calibration user name. All calibrations Display Names must be different for the current database loaded (considering all the CLX files in the project).

**Enable:** enables all write functions to the electronic device, and congruency tests. Calibrations that are not enabled are not included in any **send** or **receive** operations.

**Comment:** comment associated to the calibration channel.

**Content Options:** this field is used with the **Content** function. The **+WM** option forces the printing of all the values in the table. The text that follows appears in the notes column (in the .CON file). And at the end can be added the @ character followed by a text which will be used as a title for the table.

Example: // +WM *table f(RPM, throttle)* @ Spark Advance Map.

#### **Location**

**Box-Unit:** name of the Box-Unit destination of the calibration.

**Addr.:** absolute address of the calibration. Must be written in hexadecimal format (the 0x prefix is optional).

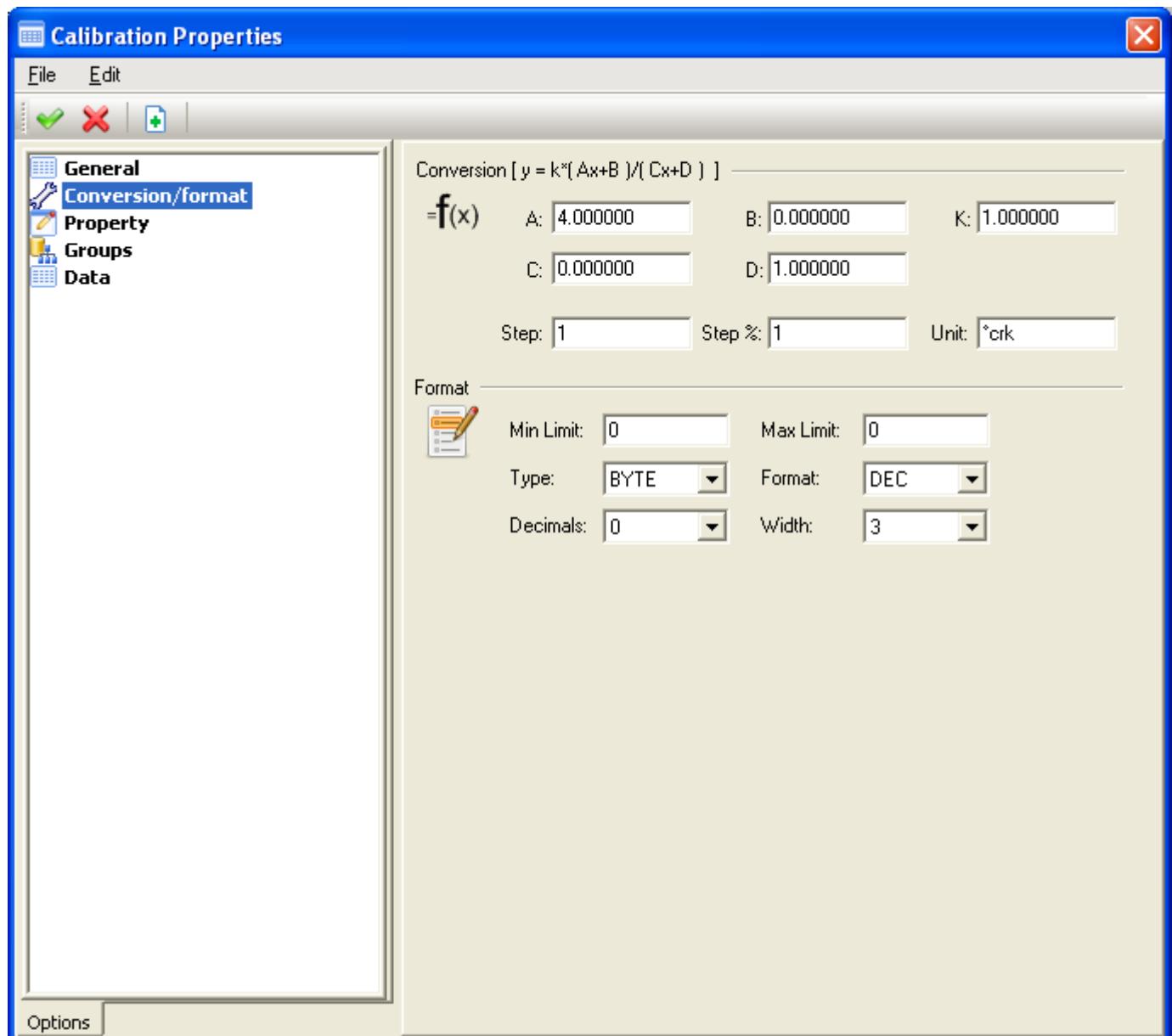
#### **Junior License**

**Read only:** forbids a user with a JUNIOR licence to modify that calibration (display and transmission to the ECU are still possible).

**Hide:** hides the calibration from a JUNIOR user.

**Protected:** enables protection management for the calibration on the electronic device.

## Conversion/format



**A, B, C, D, K:** value of the parameters used to scale the calibration using the following formula:

$$y = ((x * A+B)/(x * C+D)) * K$$

(where **x** represents the value in the electronic device).

The A,B,C,D,K parameters may refer to another calibration in the database project.

**Step:** Value of the additive step.

**Step %:** value of the multiplicative step as a percent.

**Unit:** measurement unit.

**Format:** data format in the electronic device. Available formats are: *BYTE*, *SBYTE*, *WORD*, *SWORD*, *DWORD*, *SDWORD*, *FLOATX*, *FLOAT3*.

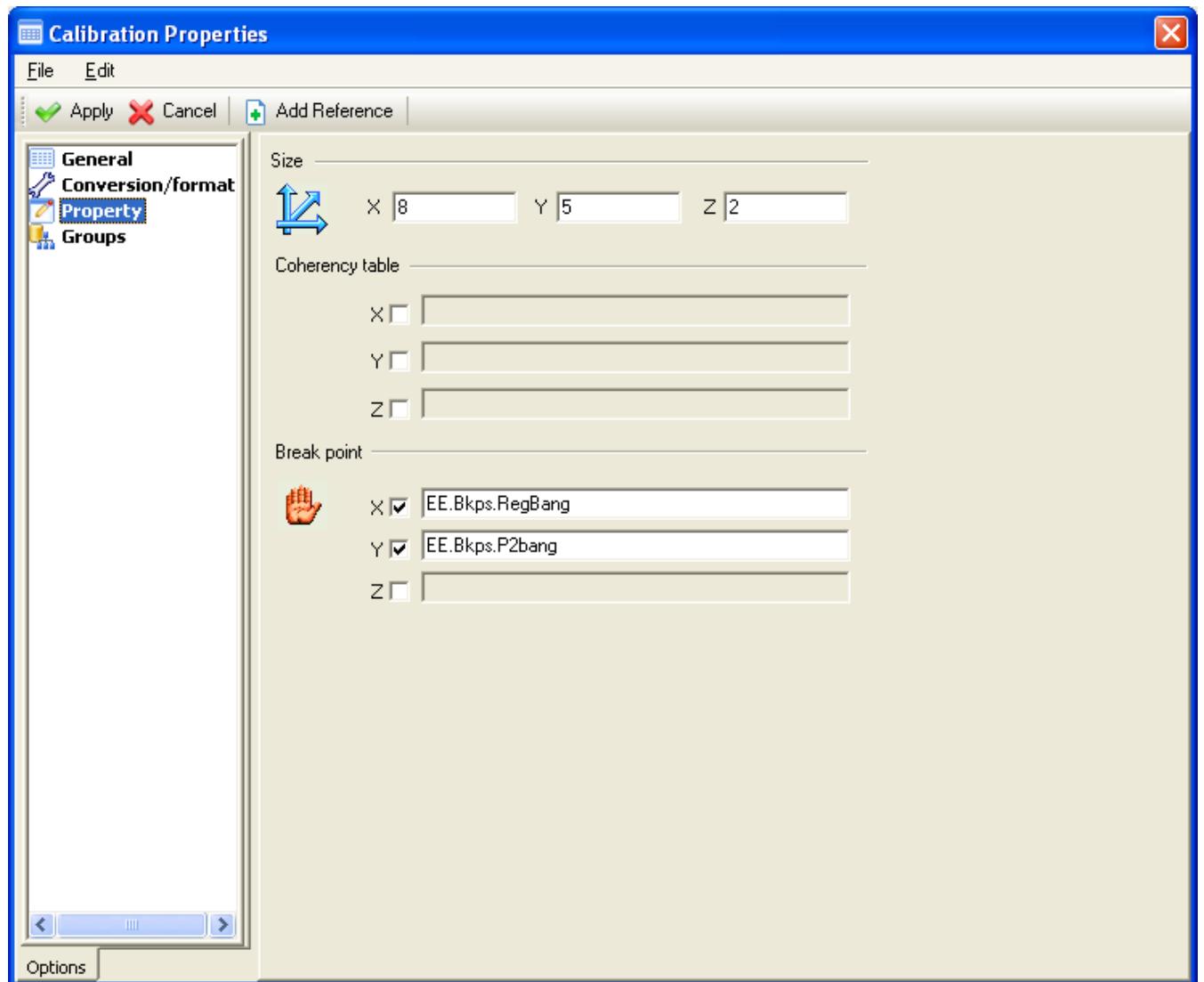
**n.Dec:** number of digits after the decimal place displayed in the decimal output format.

**Width:** field width including the sign, the decimal point and the digits.

**Format:** output format for the edit window: *HEX*, *DEC*, *FLOAT*, *ASCII*, *ENUM*.

**Limits:** Minimum and Maximum values for the calibration.

## Property

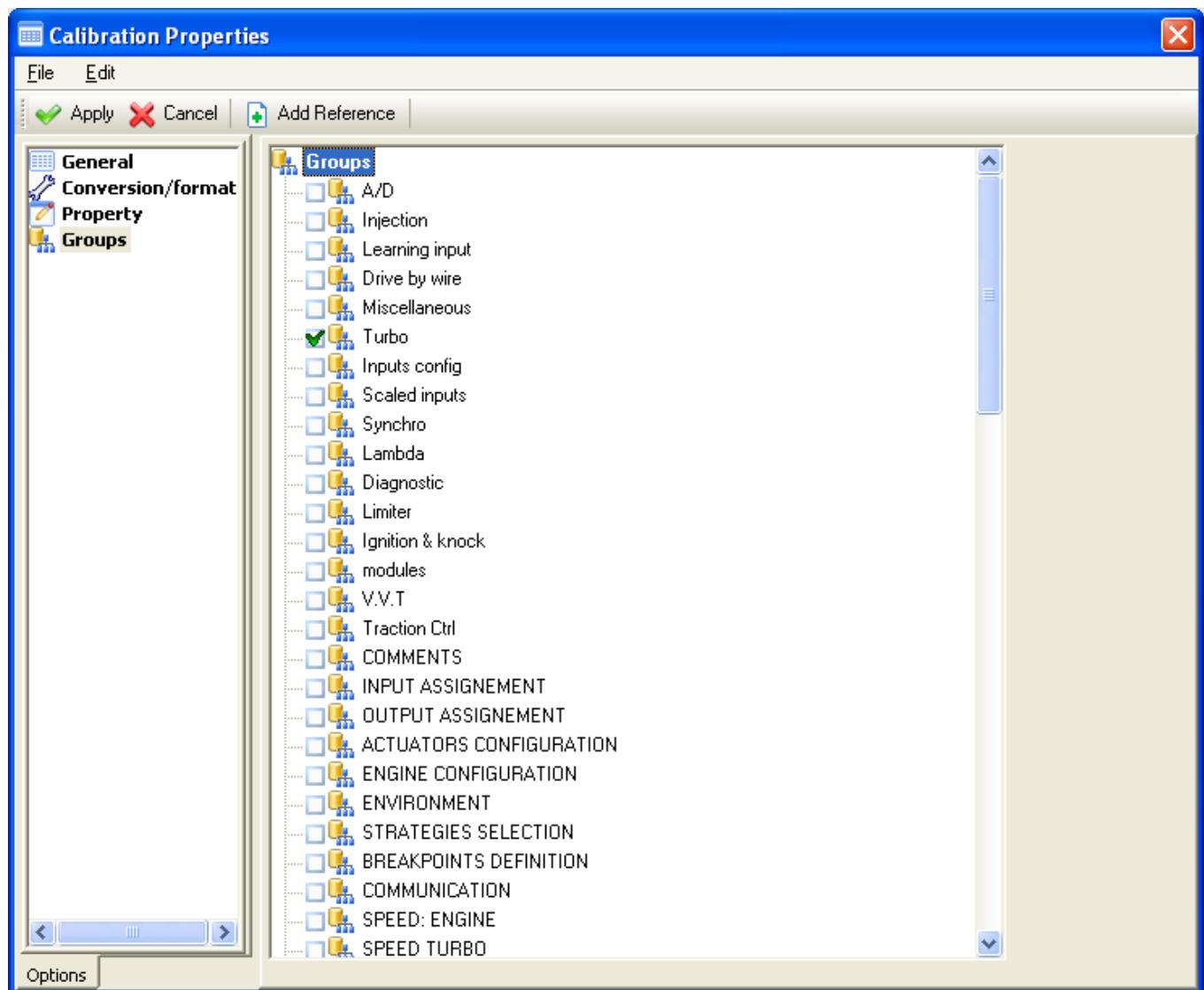


**Size x, y, z:** dimensions of the calibration along three axes. The maximum dimension of the X-axis is of 256 cells. The maximum overall dimension of the calibration is 163884 cells ( $X \times Y \times Z$ ).

**Size coherency tables:** name of one of the calibrations of the current file. The dimensions of this calibration are 1,1,1; it contains a value that must be equivalent to the dimension of the calibration (for the coherency test during the file read/write phase).

**Break point:** allows you to select another calibration as an array of break points for the various axes (x,y,z). The names displayed are defined in the reference field of each calibration. You must make sure that the properties of this array are compatible with the calibration in question. In any case the editor looks for and corrects any incoherence.

## Group



This page shows the list of Groups each calibration channel can be associated to. User can select here one or more Group for the calibration.

# Mapping

## Start/Stop Mapping

This function allows you to rapidly fill in a set of maps. You must first create a page with a Potentiometer window, and assign the mapping function to the window. See the **Project Setup/Mapping** configuration.

Run command **Start Mapping** from ECU/Calibration

If the configuration is correct, SYSMA validates the **F8 Memo** key. The mapping function only works in the configured Potentiometer window.

Each potentiometer defined in the MapList can be temporarily be dissociated from the mapping function, in which case it still works in the same manner but the correction it represents is not taken into account when the storing command **F8** is used. This deactivation can be obtained by clicking on the "off" button on the right of the value field, or by using the **F3-Map** key in the function bar.



The potentiometer field(s) assigned to a map in the **Map list** are given a certain colour. Red is the default color; green is used if the motor's current work point corresponds to a breakpoint on the map (**centered breakpoint**). In this case you may press the **F8 Memo** key to apply the potentiometer corrections to the map points in question. SYSMA checks that the correction is applicable to the map. If the point is outside the limits of the variable, SYSMA proposes to write a value equal to the alarm limit, then if required continues with the other centered potentiometers. The **Store** button on the potentiometer desk performs the same function.

Run command **F8 Memo**

You may open the calibration channel containing the map description and display the values in the electronic device in text format. A map may be associated with each potentiometer, but SYSMA only displays the map associated with the current potentiometer. You don't have to open this calibration: if you do not, the values are only modified in the electronic device.

## Open mapping...

This command opens a window to select the calibration channel.

SYSMA searches in the CLX Database selected for the table whose address and type match the definition of the potentiometer described in the Map List. If the table is found, SYSMA opens the edit window, reads the values contained in the electronic device and displays them in the window. Values that differ between the original file and the electronic device are displayed with a blue background. The work point is also displayed.

The address of the table as well as the one for the pointer in the table, are defined in the configuration menu of the MapList function (respectively *Main\_address* and *Displacement*). The *Main\_address* can either be directly the hexadecimal value of the address, or a channel from the Channel List (it's the value contained in this DWORD type channel that gives the table's address). *Displacement* is the address of a WORD type channel (as well as for the *Main\_address*, the address of the pointer can either be directly written, or picked from the Channel List). After memorizing the values, the potentiometers are disabled. Continuous writing may be restored manually using the **F4** key or automatically if the potentiometer returns to a neutral value. If the "work point report" function is activated, the work point is automatically saved.

At the end of the mapping session, SYSMA proposes to save each file opened and asks for confirmation. You may save the information under the same name or under another name.

**Note:** the potentiometers may open tables in several files, or in the same file.

#### Details of the mapping function

The mapping function modifies two variables in the memory of the electronic device:

one contains the **correction** value, displayed on the screen in a **potentiometer** field (may have its own **conversion** function: CnvCorr);

the other is a **map** box: its address depends on the motor's work point.

You may load a calibration channel and associate it with the potentiometer, including its structure of variables. SYSMA displays the map values in the edit window with the scale from the table. The conversion is read in the calibration channel: CnvMap. If no calibration is open, the CnvMap conversion function is read in the configuration file. You may modify the potentiometer, which displays a converted value (CnvCorr) that represents a value in the electronic device and in units of the electronic device.

When you activate the "Memo" function, SYSMA performs the following:

1. Calculates the address of the map cell (Offset + Base address of the table): *AddrMap*;
2. Reads this cell (in units of the electronic device) [*AddrMap*] -> *ValMap\_ecu*;
3. Converts this value using CnvMap : *ValMap\_ecu* -> *ValMap\_eng*;
4. Reads the potentiometer correction applied to the electronic device *ValCorr\_eng*;

Applies the correction using the potentiometer's operating mode (define in the configuration). Everything is in converted values *ValMap\_eng* and *ValCorr\_eng*;

- o **Percentage**     $ValMap\_eng = ValMap\_eng * ValCorr\_eng;$
- o **Additive**       $ValMap\_eng = ValMap\_eng + ValCorr\_eng;$
- o **Absolute**      $ValMap\_eng = ValCorr\_eng;$

this modification is performed only if the potentiometer value is different from the "neutral" value defined in the configuration file.

5. Performs an inverse transformation of the result to restore the electronic device format  $ValMap\_eng \rightarrow ValMap\_ecu$ ;
6. Checks that the value fits in the format limits, and writes to the electronic device at the address  $AddrMap$ .  $ValMap\_ecu \rightarrow [AddrMap]$ ; verifies the write and updates the alphanumeric window (if it is open),
7. Cancels the continuous write function when using a desk with absolute potentiometers (AMC4/6). On the other hand, SYSMA keeps the continuous write function when using manual potentiometer or a desk with incremental encoders (SB1).
8. Restores a neutral value to the electronic device correction depending on the mode of the potentiometer:

Percentage     $ValAzz\_eng = 1.0$

Additive         $ValAzz\_eng = 0.0$

Absolute         $ValAzz\_eng = ValCorr\_eng$               (The actual value of the potentiometer is kept allowing fast mapping)

When using an external potentiometer desk with absolute potentiometers AMC4/6, the user must turn back the knobs to the neutral values 1.0 (Perc) and 0.0 (Add) in order to return in "write continuous" mode. When using manual potentiometers or desk with incremental encoders SB1 then SYSMA turn back automatically the  $ValCorr\_eng$  to these neutral values without intervention from the user.

This value is translated into the units of the electronic device by an inverse transformation of CnvCorr :  $ValAzz\_eng \rightarrow ValAzz\_ecu$ , and sends the value to the electronic device.

To summarize, SYSMA works in converted values. Correct operation depends on proper configuration of the scales in order to best simulate the internal computation of the electronic device.

## Data Recorder

### General remarks

You may save certain parameters corresponding to a given work point. These parameters must be measurement channels defined in the current Database. The description of this report is stored in a *filename.WPF* file, while the report itself is stored in a text file *filename.PQT*.

Data may be stored in this file and/or sent to the printer.

To save the work point, press *Ctrl-Space* or the *Memo* key of the automatic mapping function.

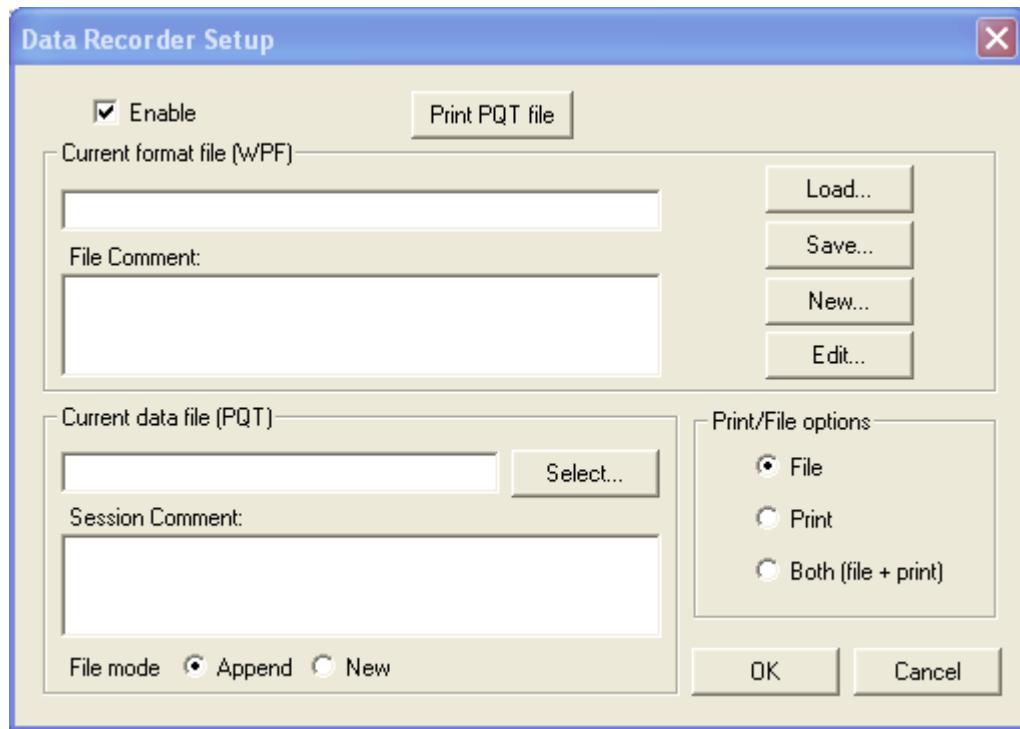
Each new session is added to the end of the *filename.PQT* file (in *append* mode) or replaces the previous file (in *new* mode).

The user can setup the configuration in the *ECU/Data Recorder* menu. Use the *Tools/General Options/Data Recorder* page to modify some of these parameters.

When SYSMA is started, the preferences file specifies the name of the *.WPF* file to use.

## Data Recorder Setup

Call the configuration tool from the main menu: *ECU/Data Recorder/Setup Data Recorder*.



**Enable:** starts the session as soon as SYSMA is started.

**Current format file:** name of the *.WPF* configuration file used.

**Load:** selects another *.WPF* file.

**Save:** saves the *.WPF* file with a new name.

**New:** creates a new *.WPF* file.

**Edit:** modifies the current configuration.

**Comment:** user comments.

**Data file:** name of the *.PQT* file where the records will be written.

**Select:** selects an existing .PQT file from the disk.

**Session Comment:** comments included in the header of each session.

**File Mode:**

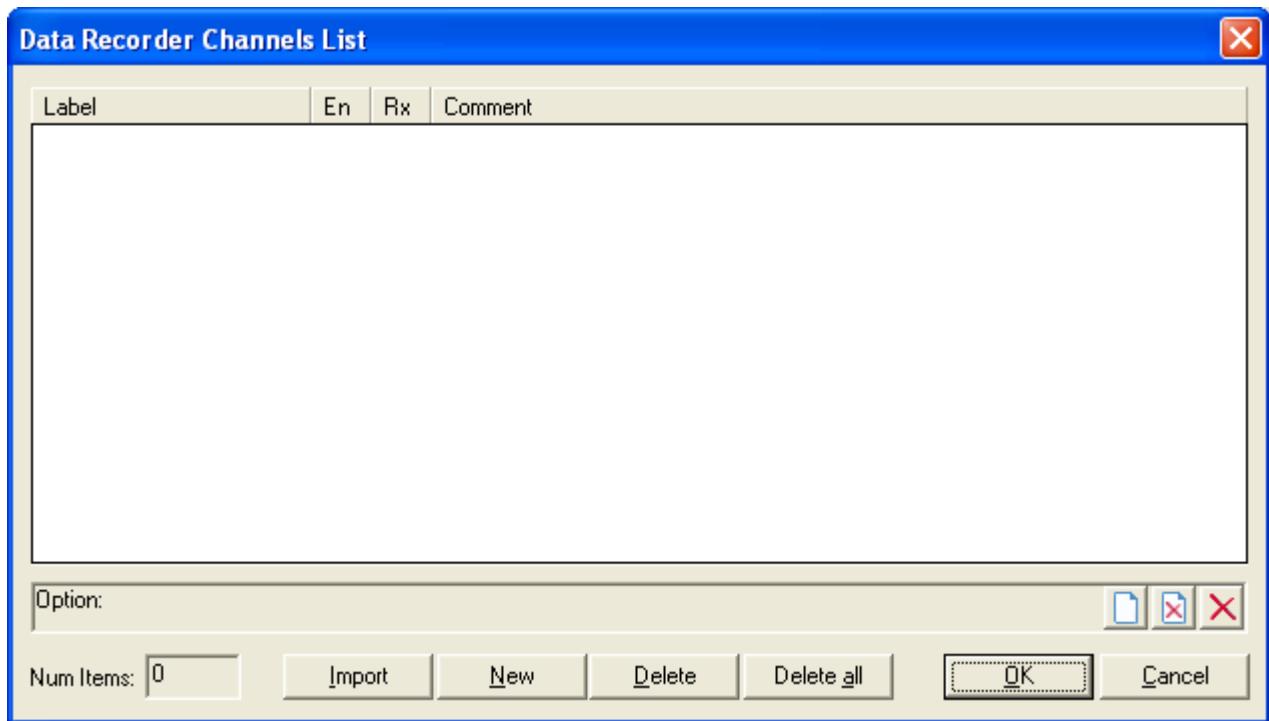
“Append” mode: adds sessions to the file at the end of the previous session; “New” mode: erases the file before each new session.

**Print PQT file:** prints the current .PQT file.

**Print/File options:** allows you to indicate if the report should be sent to a file, to the printer, or to both. The default Windows® printer is used.

**Cancel:** exits the configuration menu without saving any changes.

**OK:** exits the configuration menu, saves the .WPF file and updates the related choices in the Preferences file.



**Data Recorder Channels List** window allows set-up for work-point channel list.

The user can rely on controls for editing the list of relevant channels during the acquisition setup; the introduction of new elements can be operated both with the “**New**” button and with the “**Import**” button:

**New:** it moves the focus on the SYSMA Channel Browser, allowing to move a set of elements; the multiple selection is allowed via Ctrl/ Shift keys + mouse.

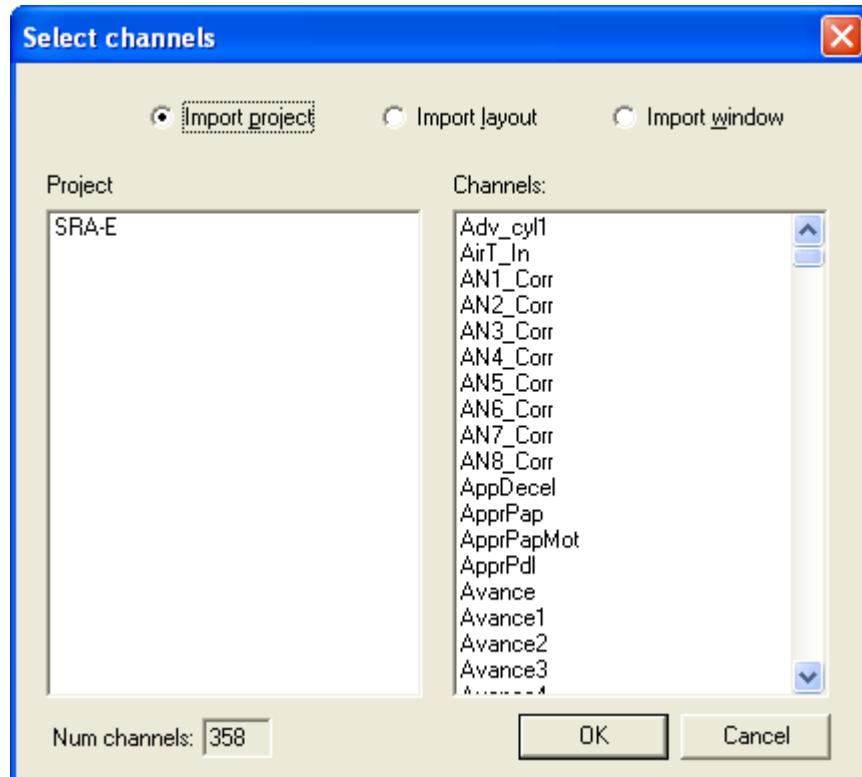
**Import:** it presents different options for importing all the elements contained in a framework (configuration/ page/ window);

- Import project: it reports the full list of channels used in the project and provides a button to accept the operation. The number of elements is presented for a check before confirming the import.
- Import layout: it reports the full list of channels used in the active layout and provides buttons to accept the operation or to browse to a different layout; if the user prefers a different layout, the application moves to this layout and the list of channels is refreshed. The number of elements is presented for a check before confirming the import.
- Import window: it reports the full list of channels used in the active window and provides a button to accept the operation or to browse to a different window; if the user prefers a different window, the application moves to this window and the list of channels is refreshed. The number of elements is presented for a check before confirming the import.

The maximum number of channels that can be included in the list is 256/ processor.

When the user decides to capture the instantaneous values of these channels, the sequence of operations will be:

1. start the Data Recorder session (On/ Off Data Recorder);
2. write the Data Recorder samples to the destination file (Save data to file)



It is possible to import all channels from current project, from a layout or from a single window.

## On/Off Data Recorder

Use the following command from the main menu to start the session: *ECU/Data Recorder/On / Off Data Recorder*.

When opening or closing a session, SYSMA asks you to confirm. A confirmation message appears in the status bar. You may enter new comments at the start of each session.



To save the session: *ECU/Data Recorder/Save data to file*.

The status of the function (On/Off) can be monitored in the *ECU/Data Recorder/On / Off Data Recorder* menu.

If the session has not started when you request to write, SYSMA proposes to open the session.

A confirmation message is displayed in the status bar every time you save a session.

The acquisition of the channels could be configured to run over a periodical basis; this state is entered if the user selects the command "Continuous" .

The user can specify the acquisition period when the session is started; in case this period proves to be small with respect to the real scan time, the capture of the channels continues, although with performance lower than expected.

The data are saved in the target ASCII file: an enhanced PQT file is proposed, including the raw value of the channel (transmitted by the ECU), in addition to the value resulting from the elaboration formula.

## Post-processing the values of the channels

SYSMA will support the access to the simulation mode, if a project file is open and the link with the ECU is OFF.

To start the simulation, the user loads one data file (using  **Load data form file ...** command from **ECU/Data Recorder** menu) and SYSMA will look for a correspondence with the channels belonging to the project, using the name as a key.

The values from the data file are then assigned to the channels in the project. Any analysis and action that SYSMA usually takes when receiving the channel value from the ECU is executed

(alarms, diagnostics, virtual channels), thus fully simulating a refresh of the channels via MTP protocol

Two modes of simulation are available:

1.  Single step: only one session from the data file is reproduced at each request by the user;
2.  Continuous: all the sessions from the data file are automatically reproduced in sequence, keeping the time schedule saved with the sessions.

In case one channel in the project doesn't meet the corresponding value in the file, then SYSMA assigns "No-Rx" to it.

To stop simulation process call command  **Replay Stop** from **ECU/Data Recorder** menu.

## Print Data Recorder Log

For the "Print Data Recorder Log" function, you should not print a page for each new work point. SYSMA sends the data without a page break, and only to a local printer (not to network printers) declared as the default printer under Windows®.

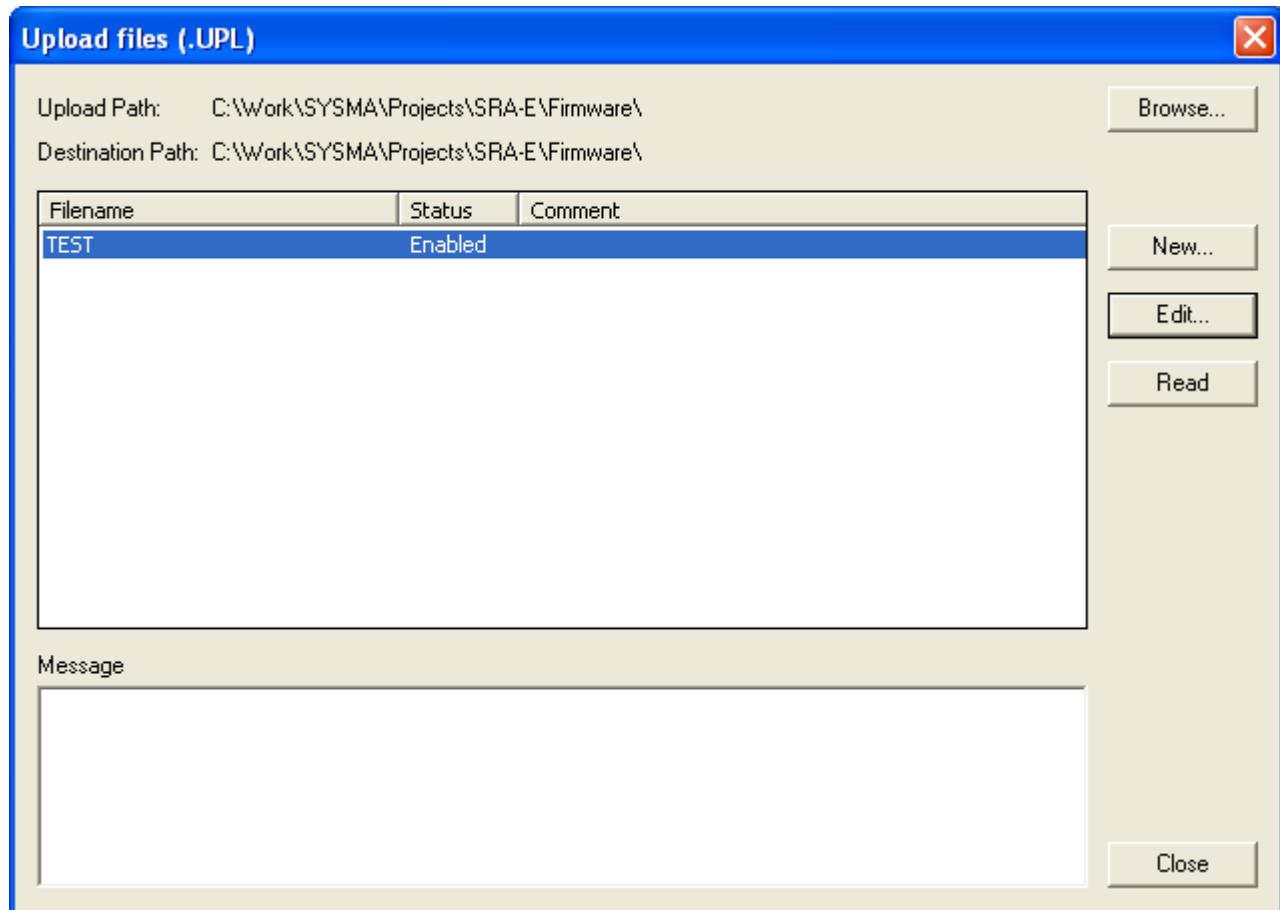
This solution is appropriate for dot matrix printers with continuous paper supplies. For printers with sheet feeders, the pages are only printed when full or when you close the WPR session.

For network printers, you should print the entire file at the end of the session (use the "*Print PQT file*" button in the Data Recorder Setup window).

# Upload From ECU

The *Upload From ECU* function enables to save, in a binary file, a specific memory zone uploaded from the ECU. This function is either used for software scrutineering (by legal authorities) or just to save some diagnostic information saved in the ECU's memory.

The list of the different memory zones to upload and the corresponding file names are defined in an .UPL file. The directory in which the upload files are saved is the same as the one defined in the path for the .TAB files (binary files containing the whole of the EEPROM).



## First page

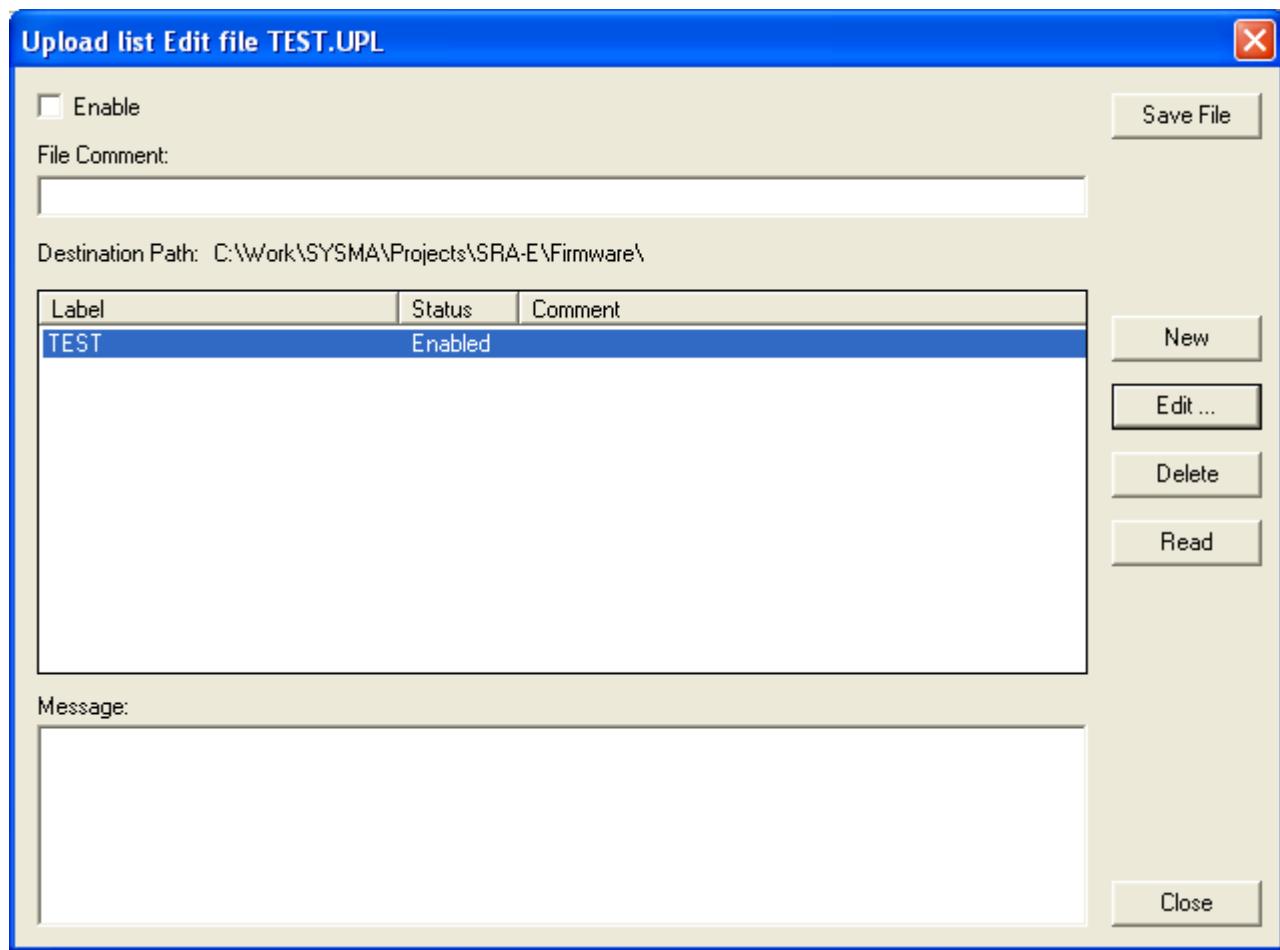
**Browse:** directory change when looking for .UPL files.

**New:** creation of a new .UPL file.

**Edit:** modification of the selected .UPL file, the second page then appears.

**Read:** executes the list of commands contained in the selected file.

**Message:** information about the current operations.



## Second Page

**Enable:** enables this file to be used with the "READ" key on the first page.

**File comment:** user's comments can be typed there.

**Save File:** saves the .UPL file.

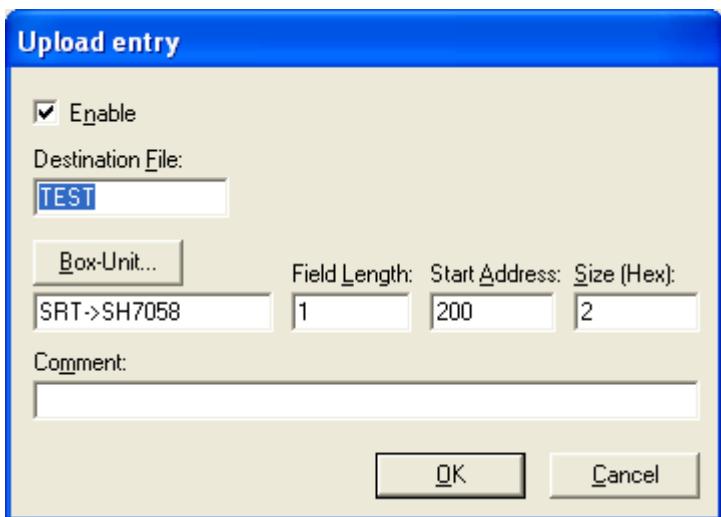
**New:** creates a new memory bloc description in the list.

**Edit:** opens the third page to define the bloc parameters.

**Delete:** suppresses the selected bloc description.

**Read:** reads the selected (test of the bloc description).

**Message:** information about the current operations.



## Third page

**Enable:** enables this bloc to be used with the "READ" key on the first or second page.

**Destination File:** file name (\*.bin) under which the memory bloc will be saved.

**Box-unit:** name of the memory in the ECU on which the "READ" command will apply.

**Field length:** access mode to be used depending on the memory mapping. This value gives the number of bytes to be read in a single instruction. This is necessary for access to some components having special mechanism (dpram) or special mapping (intel-mode, LSB first). This value should be 1 for an 8-bit mapping and 4 for a 32-bit mapping.

**Start Address, Size:** bloc size (in bytes) and start address.

## Blue Tooth connection

It is possible to connect SYSMA via Bluetooth to different ECUs during the work session. Two different approaches can be valid, one local to SYSMA, the other involving the application installed with the Bluetooth key.

It is necessary to have a Belkin Bluetooth dongle key and all appropriate drivers are installed and working.

### Handling multiple links with SYSMA

This approach aims at limiting the operations as much as possible in SYSMA. It includes a configuration stage, preparing the links that the operator can then select while running the protocol in SYSMA.

### Configure Bluetooth for multiple connections

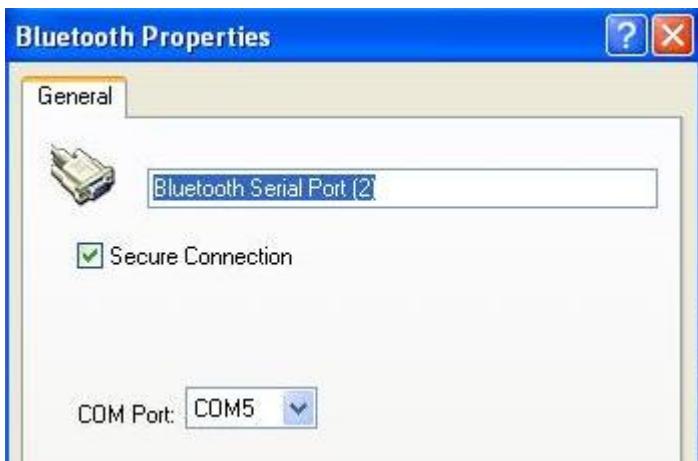
This paragraph describes how to configure Bluetooth on the PC in order to have multiple links that the operator can then select directly in SYSMA.

Some of these operations, once executed, should not be repeated; details are explained step by step.

## Add Bluetooth serial port

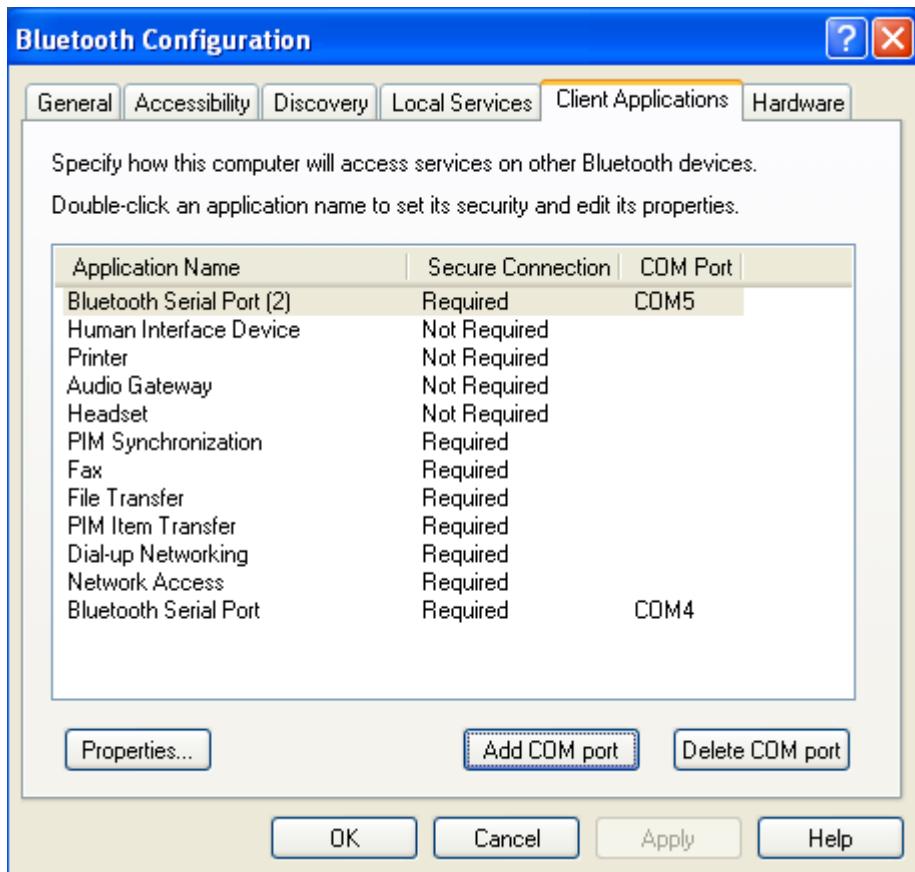
The steps in this section describe how to create multiple instances of Bluetooth serial port, useful to assign one dedicated link to each ECU the operator needs to monitor:

1. Double click on the *My Bluetooth Places* icon on your desktop and go to the *View or modify configuration* drop down menu.
2. Click on the *Client Applications* tab: you will see the COM port created with the installation.
3. Click on the *Add COM port* button: you can add a new Bluetooth serial port and assign it to another virtual com port (such as COM5).
4. Click OK.



The number of virtual COM ports should equal the maximum number of ECUs that you require to select in SYSMA; for example, with two instances of Bluetooth Serial Port, you can select two ECUs in SYSMA. It is possible to create until seven COM port for seven different ECUs.

Once the number of ports equals the maximum number of ECUs to contact during SYSMA session, this operation can be skipped.



COM4 is the COM port created with the installation; COM5 is the COM port configured for the second ECU.

## Search for ECU devices

The steps in this section describe how to search for ECUs within range of the PC:

1. Click *Search for devices in range* from the drop down menu in *My Bluetooth Places* window.
2. ECUs names appears in the *My Bluetooth Places* window.

Once all the ECU units within the range of the PC are discovered, this operation can be skipped; this action is typically executed when a new ECU enters the range of the PC. It is not required in case the ECU exits the area of the PC and then approaches it again.

## Create the link with the ECUs

The steps in this section describe how to create a link between Bluetooth serial ports and ECUs.

1. Establish a serial port connection between the PC and ECU1: right click on the “ECU\_\_\_” icon and select *Connect to Bluetooth serial port*.
2. Your computer will ask for a PIN code: use ECU1 PIN code.
3. A window will appear, showing the COM port reserved for the connection. Click OK and ECU1 icon will become green, meaning that the Bluetooth connection is active.

For the connection to ECU2, repeat the same procedure, entering ECU2 PIN code.

The COM ports are now assigned.

Once all the ECU units to be monitored are linked, this operation can be skipped; in fact the PC saves this PC-ECU association and can restore it also after its power-cycle.

This step is typically executed when a new ECU enters the range of the PC or in case one ECU is replaced by a new ECU: in this second situation, you should disconnect the link with the outgoing unit and assign the free COM to the new ECU.

## Switch connection with SYSMA

This paragraph describes the method for swapping SYSMA Bluetooth link from ECU1 to ECU2:

1. Select the COM port assigned to ECU1 (such as COM4) from the ECU combo box of the main toolbar.
2. Click on the semaphore for starting the link: SYSMA will present the name of the ECU connected on the selected COM port.
3. SYSMA now runs the protocol with ECU1.
4. To switch the connection to ECU2, select the COM port assigned to ECU2 (such as COM5) from the combo box of the ECU toolbar (it is not necessary to stop the link with ECU1).
5. SYSMA will present the name of the ECU connected on the selected COM port.
6. SYSMA now runs the protocol with ECU2.

## Update of the ECU PIN

This section details the case of PIN modification, pointing out that this operation can be completely handled in SYSMA:

1. Establish a Bluetooth connection between the PC and the ECU2 and write the calibration PIN.
2. Click on the semaphore to stop the connection with ECU2.
3. Perform the power cycle of ECU2.
4. Click on the semaphore for starting the link with ECU2: you will see a message indicating than you need to enter the PIN code.
5. Click on the message box to display the dialog box requesting the pin code and enter the new PIN code of ECU2: SYSMA is now connected with ECU2.

## Handling multiple links with Belkin software

1. Establish a serial port connection between the PC and ECU1: right click on the ECU icon and select “*Connect to Bluetooth serial port*”.
2. Your computer will ask for a PIN code: enter ECU1 PIN code.

3. A window will appear, showing the COM port reserved for the connection. Click OK and ECU1 icon will become green, meaning that the Bluetooth connection is active.
4. Select the COM port assigned to ECU1 (such as COM16) from the combo box of the main toolbar.
5. Click on the semaphore for starting the link: SYSMA will present the name of the ECU connected on the selected COM port.
6. SYSMA is connected with ECU1.
7. Disconnect SYSMA from ECU1.
8. Open the “*My Bluetooth Places*” window, right click on the ECU1 icon and select “*Disconnect Bluetooth serial port*”.
9. Repeat the steps 1-3 to create a link to ECU2: the same Bluetooth COM port, now free from ECU1, will be assigned to ECU2.
10. Select this COM port from the combo box of the main toolbar and click on the semaphore for starting the link. SYSMA will present the name of the ECU2 connected on that COM port.

SYSMA is connected with ECU2.

# DataLogger

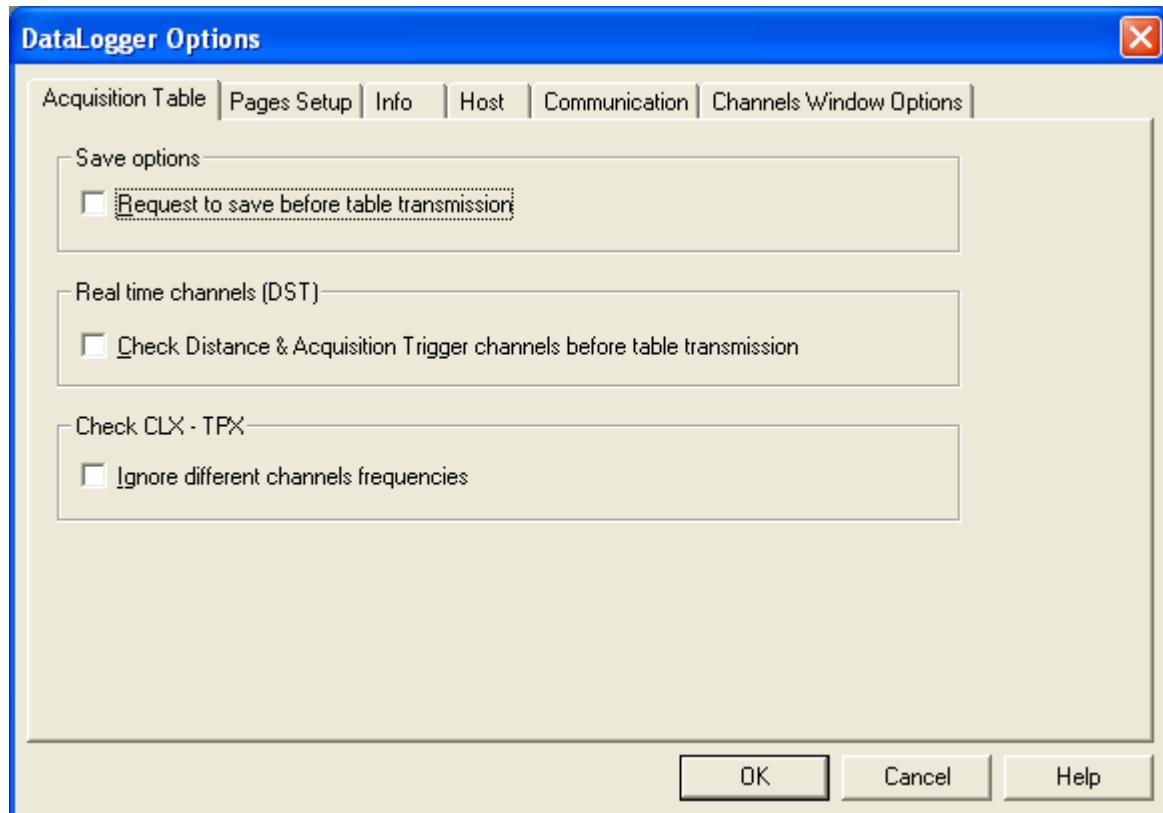
*DataLogger* environment collects features and commands that allow to operate with Data Logger devices. SYSMA is able to:

- create, edit and analyze logging tables in dedicated windows (*Logging Channels table*), save to disk their configurations;
- program devices by sending logging tables, consisting of a list of channels;
- send other specific command to the logger (Info Release, Restart, Clear, Trigger, Zeros);
- download from the logger the current logging table;
- display real time values of channels configured on logger, in *Data Logger Channels* window.

## DataLogger Options

In *DataLogger Options* window you can find settings for Data Logger device communication management and customization for windows used in Data Logger environment (*Logging Channels table* window and *Data Logger Channels* window). Select *DataLogger / DataLogger Options* in main menu to open the window.

### Acquisition Table



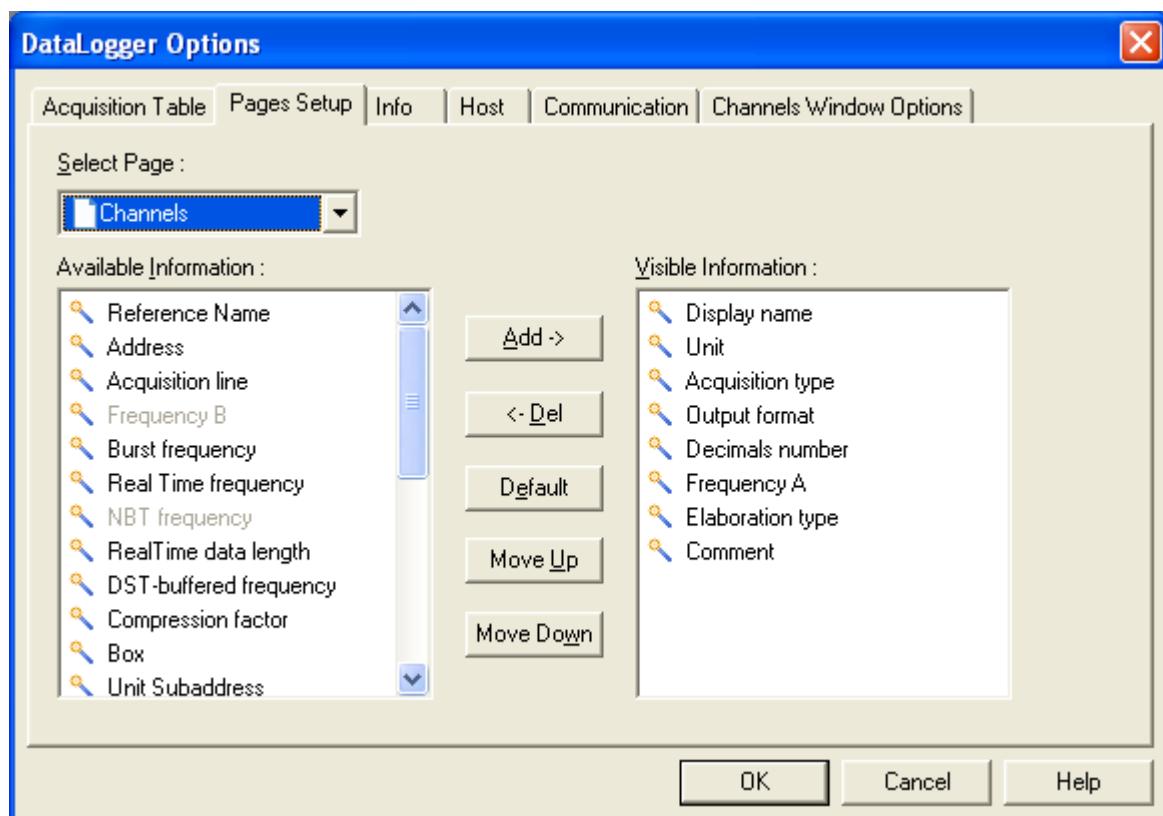
Settings of the check options during the table edit.

**Request to save before table transmission:** if this option is selected, SYSMA will prompt the user to save the configuration file for Logging Channel table before transmitting the table to the logger.

**Check Distance & Acquisition Trigger channels before table transmission:** if this option is selected, SYSMA will check channels configured for *Distance* and *Acquisition Trigger* conditions in the logging table, before sending the table to the logger.

**Ignore different channels frequencies:** if this option is select, SYSMA will skip differences in frequencies when comparing *Logging Channels* table with database CLX.

## Pages Setup



Settings of the information to be shown in *Logging Channels* table windows.

**Select Page:** filters Information lists depending on *Logging Channels* table arguments.

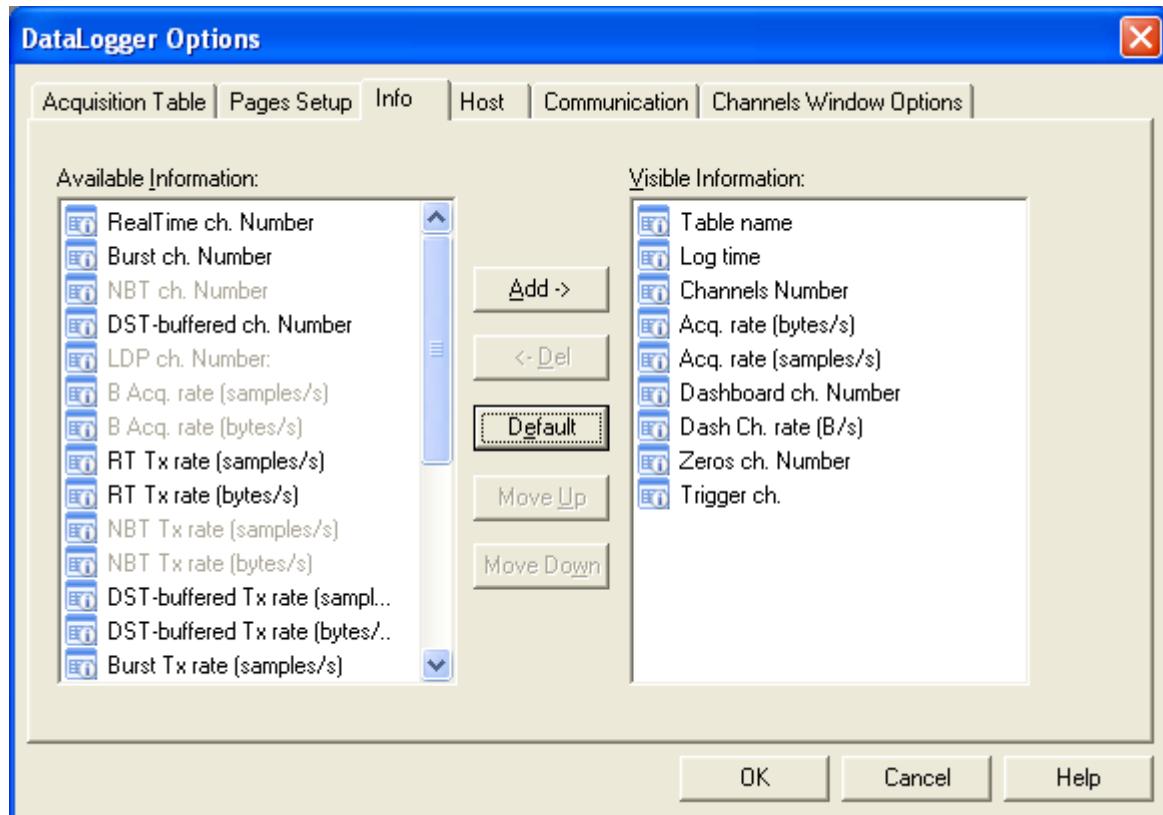
**Available Information and Visible Information:** lists will reflect selection in *Select Page*.

Use buttons **Add** and **Del** for moving items from *Available Information* list to *Visible Information* and back.

**Default:** restores default in *Visible Information* list.

**Move Up and Move Down:** changes position for selected items in *Visible Information* list

## Info



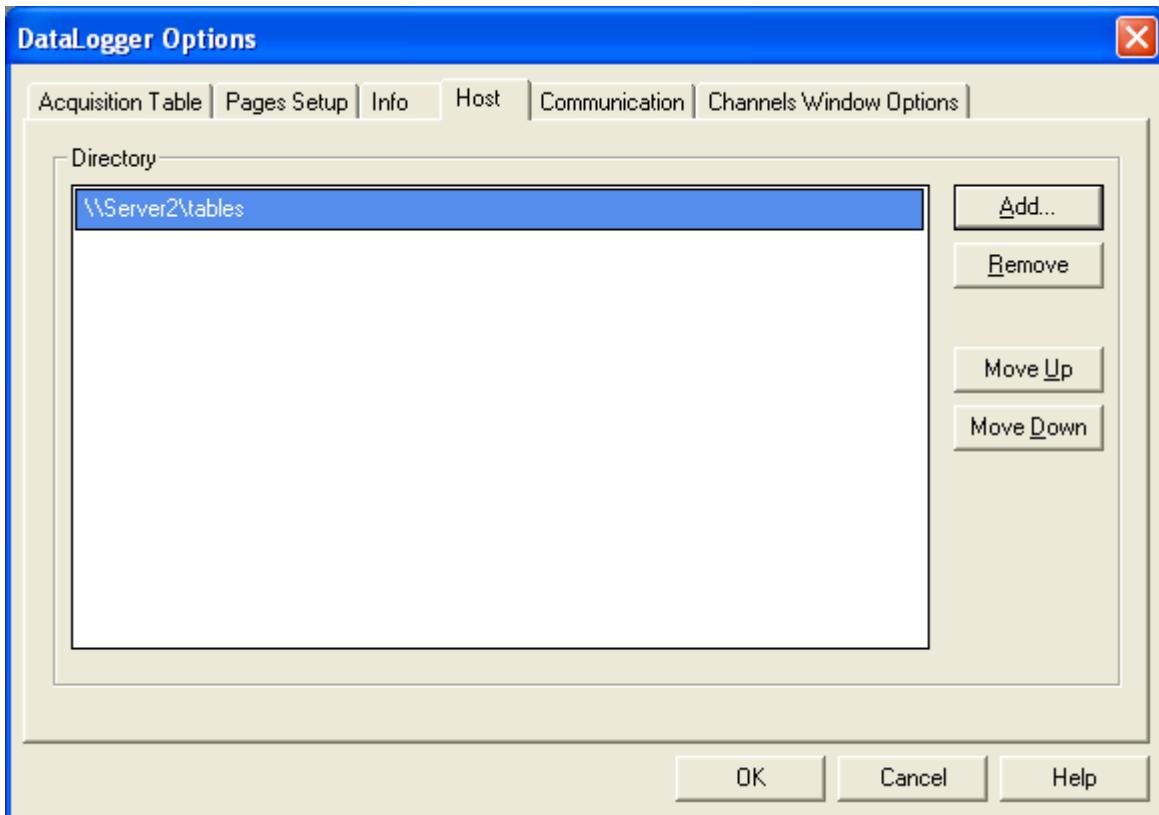
Selection of information to be shown in the bottom information toolbar.

Use buttons **Add** and **Del** for moving items from *Available Information* list to *Visible Information* and back.

**Default:** restores default in *Visible Information* list.

**Move Up and Move Down:** changes position for selected items in *Visible Information* list.

## Host



List of the directories where the sent acquisition tables (e.g. TPX) will be copied after a TX operation.

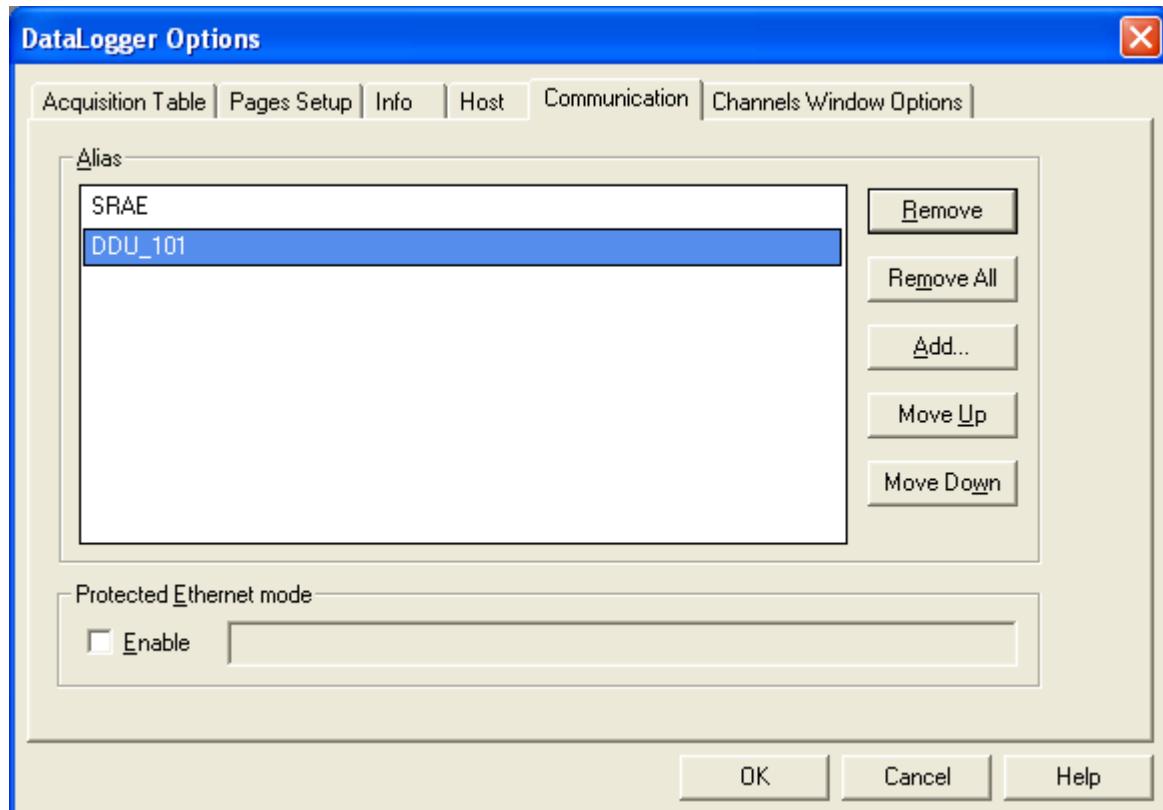
**Add:** adds a new item in *Directory* list.

**Remove:** removes selected items in *Directory* list.

**Move Up and Move Down:** changes position for selected items in *Directory* list.

## Communication

Use this dialog to create a list of *Aliases*. The *Alias* is assigned to the data logger or DST Decoder. The *Alias* is shown in all applications, which interface with the data logger via FindDevs. It allows you to use the same logging table to program different loggers while ensuring that they are easily distinguishable over the network. (i.e.: not just by the IP address or serial number).



**Alias:** list of alias names to be associated to Data Logger devices. Use buttons on the right to modify the list.

**Remove:** removes selected items in *Alias* list.

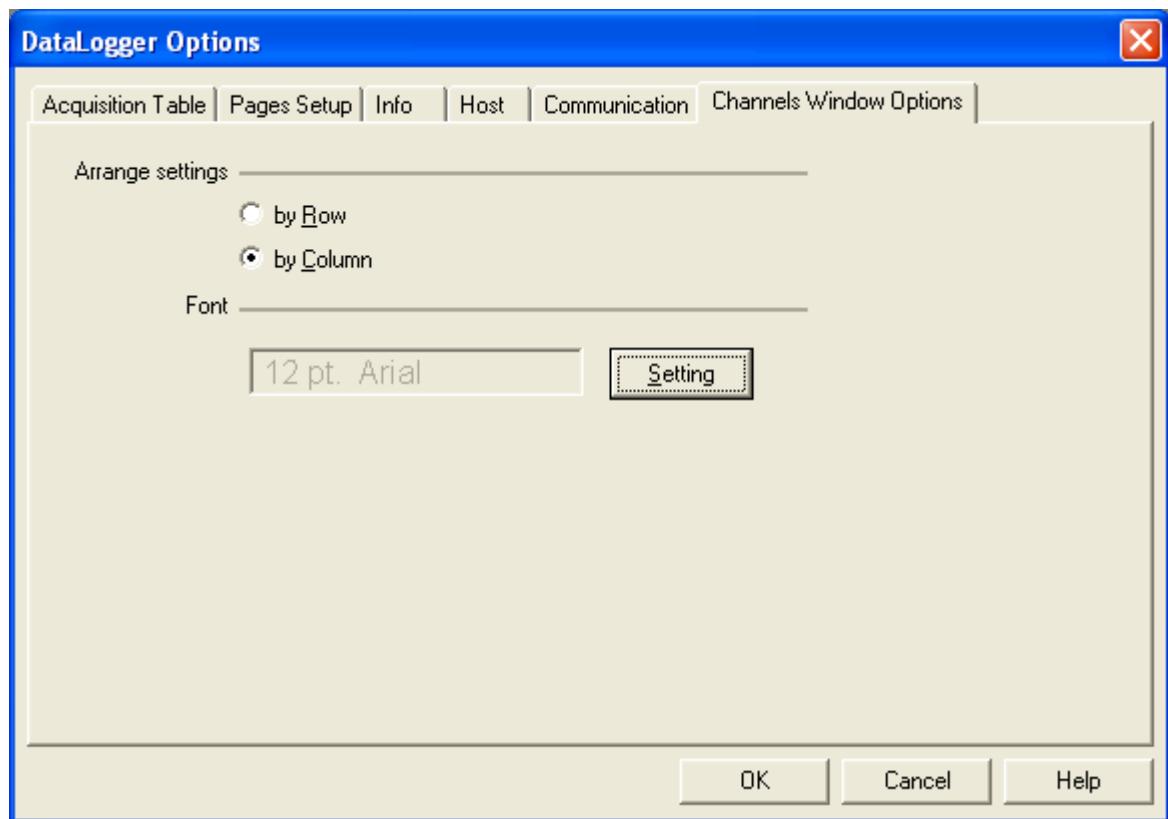
**Remove All:** removes all items in *Alias* list.

**Add:** adds a new item in *Alias* list.

**Move Up and Move Down:** changes position for selected items in *Alias* list.

The **Protected Ethernet Mode** flag allows you to set up a password for locking SYSMA to chosen device; once you set up the option you are obliged to enter the password to switch device. This is implemented to avoid unwanted changes of device.

## Channels Window Options



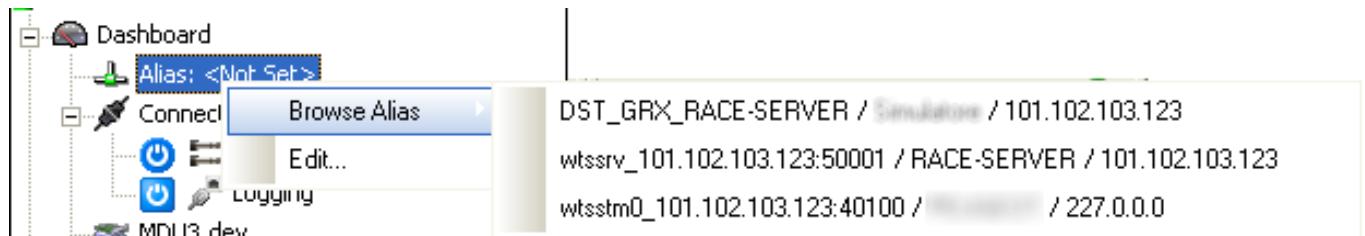
**Arrange settings:** changes the alignment type for the sequence of channels to be shown in *Data Logger Channels* window.

**Font:** allows to customize Font used for text in *Data Logger Channels* window.

## Communications with the DataLogger

In order to establish a connection to a device using the *Logging* connection mode you must select a device alias from the list provided from the system or edit manually the device alias name.

The communication alias can be selected using the right click contextual menu or edited directly writing the alias name:





The device alias list provided in the contextual right menu is obtained from the FindDevs monitoring utility. This tool is executed automatically by SYSMA at the startup and closed automatically (if no one is using it) at the exit. The last used alias is saved automatically in the project's data.

Once user has selected a device, the second step is to start communication protocol.

Note that SYSMA provides two distinct connection modes:

- **Control** connection allows to manage Calibrations (sending and receiving Calibrations from the device), Read and Write values for parameters in specific memory areas of the device, and other functions usually available on devices used to handle engine control units.
- **Logging** connection allows to program the device with Logging Channels table, manage logging features as Trigger conditions and Zeros, read actual values for logging channels, and other functions usually available on devices used to handle acquisition for telemetry data.

The availability of the connection type (*Control* and *Logging*) for each device depends on the file system Device Description file (.DEV), which is loaded into the project and associated with the device itself.

Connection command can be performed using field *Logging* in *Connection* node under *DataLogger* node in the *Project Workspace* environment window. Also *Logging* button next to *DataLogger* item in *Connection Status* environment window executes the same command.

Projects Workspace window	Connection Status window

Polls the network for the selected device. It must be active to be able to communicate with the DataLogger.

Commands for Data Logger device usage are both in *DataLogger* main menu and in *DataLogger* toolbar.



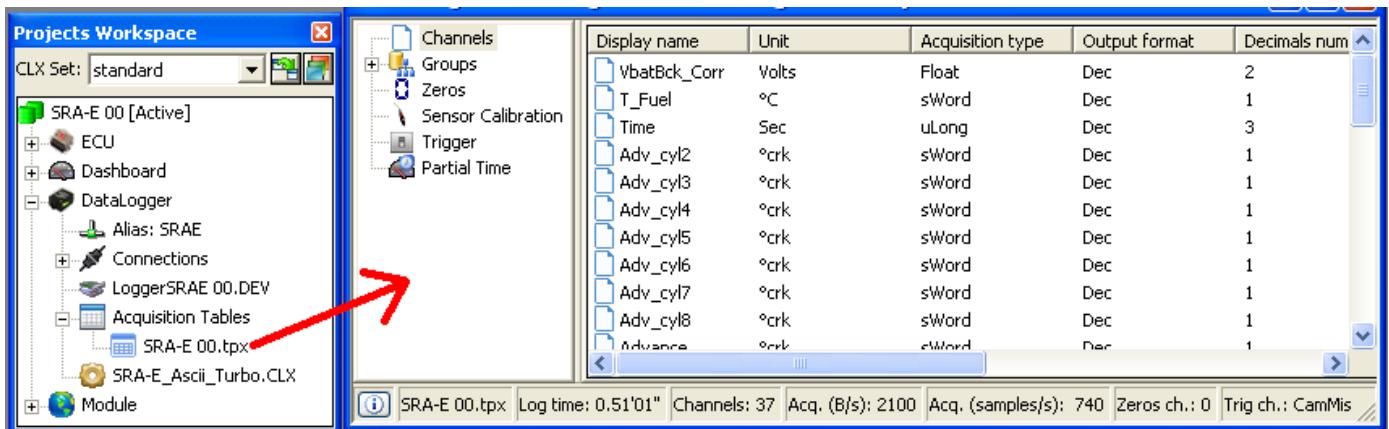
	<i>DataLogger Info Release...</i>	Displays a device information message read directly from the DataLogger.
	<i>Transmit DataLogger Table...</i>	Programs the DataLogger with the current logging table; before the table is sent, SYSMA checks the table with the limits defined in the system Device Description (.DEV) file.
	<i>Restart DataLogger</i>	Forces a restart of the logging process.
	<i>Receive DataLogger Table</i>	Downloads or uploads from/to the logger the currently used acquisition table and the system Device Description (.DEV) file.

**IMPORTANT NOTE:** to ensure correct operation of the data logger always checks if the system Device Description (.DEV) file used is compatible with the firmware version of the data logger.

	<i>Clear DataLogger/Clear Data</i>	Deletes all data stored in the logger but leaves the current logging table so that the device will continue to record as soon as the acquisition trigger condition becomes true
	<i>Clear DataLogger/Clear Data and Table</i>	Both completely erase all memory areas including the logging table. After executing either of these commands the logger must be reprogrammed with a new table.
	<i>Format DataLogger</i>	
	<i>Date &amp; Time Setup...</i>	Allows you to set the date and time of the internal clock in the data logger
	<i>Set Track Run...</i>	Sets Run counter
	<i>Set Trigger</i>	Tells the logger to activate or deactivate Trigger conditions function management
	<i>Set Zeros</i>	This command is only enabled when the <i>DataLogger Channels Window</i> is connected; it sets the configured channels to their target values
	<i>Activate Channels View</i>	Tells the logger to start (or stop) logging real time values for channels configured on board, and displays channels values in <i>DataLogger Channels Window</i> .
	<i>Open Channels View Custom Filter...</i>	Opens the configuration window for filtering channels to display in <i>DataLogger Channels Window</i> .
	<i>DataLogger Options...</i>	This command opens the dialog for the DataLogger Options setup.

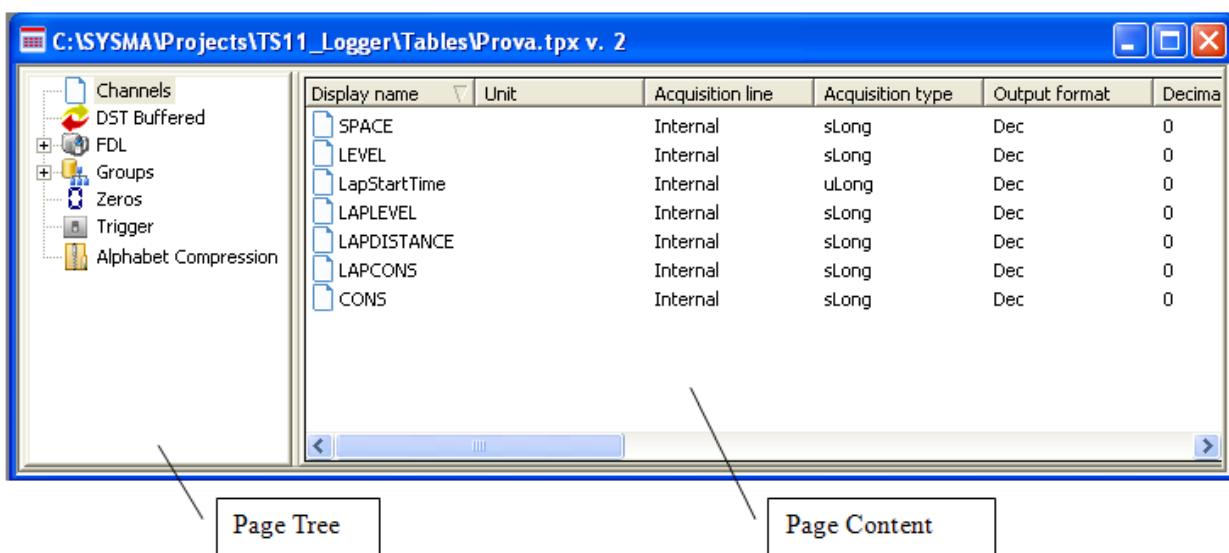
# Logging Channels table

Logging Channels table windows can be opened by double clicking on their relative configuration TPX file icons in the project workspace tree:



Note: Logging Channels tables can be opened only if a system Device Description (.DEV) file is present in the DataLogger node of the project.

SYSMA allows you to open several Logging Channels table windows. Each window allows you to edit the content of a TPX file with the layout below:



## Page Tree

This window displays the pages of the table in a tree structure on the left and the page content on the right.

The contents of the Page Tree depend on the logger configuration. The configuration is defined by:

1. the system Device Description (.DEV) file connected with the data logger device;

- the TPX settings (e.g.: if you want to display the dashboard select *DataLogger->Dashboard->Select Dashboard* ).

## Page content

Page	Content
Channels	All the channels included in the acquisition table
RealTime	RT telemetry channels with frequency > 0 Hz
Burst	Burst telemetry channels with frequency > 0 Hz
NBT	Narrow Band Telemetry channels with frequency > 0 Hz
DST Unbuffered	Unbuffered DST channels with frequency > 0 Hz
DST Buffered	Buffered DST channels with frequency > 0 Hz
LDP	Board Diagnostic channels with frequency > 0 Hz
FDL	Fast Data Logging
Groups (root)	All the channels included in the acquisition table
[Group Name] (child)	Filters channels by selected user-defined group (e.g. <i>Chassis, Engine</i> )
Zeros	All channels set up for zeroing
Trigger	Acquisition and high frequency trigger
Alphabet Compression	List of alphabets configured for the table
Dashboard (root)	Groups dashboard subtables (for future use)
Dash Channels	Channels included configured for display on the dashboard

To edit the properties of any channel double click on the entry or select *Edit/Properties*. Use *Shift* or *Ctrl* to perform multiple selects. When editing a multiple channel selection only the allowed property fields will be enabled.

## Channels page

The *Channel* page shows all the channels in the current logging table. Double click on a channel to edit its properties.

**If you delete a channel from this page it is removed from the logging table.**

## NBT, RealTime, Burst, DST, LDP, Groups, Dashboard pages

These pages filter the channels displayed according to the Page Tree context. You can add channels to a page by dragging from another page (this sets the frequency to its default minimum)

or by editing the relevant properties. You can add more than one channel at a time by using the standard group select operations.

If you delete a channel from these windows it is not removed from the logging table, only from the context (i.e. deleting a channel from the *RealTime* page simply sets the Real Time telemetry frequency to 0 Hz).

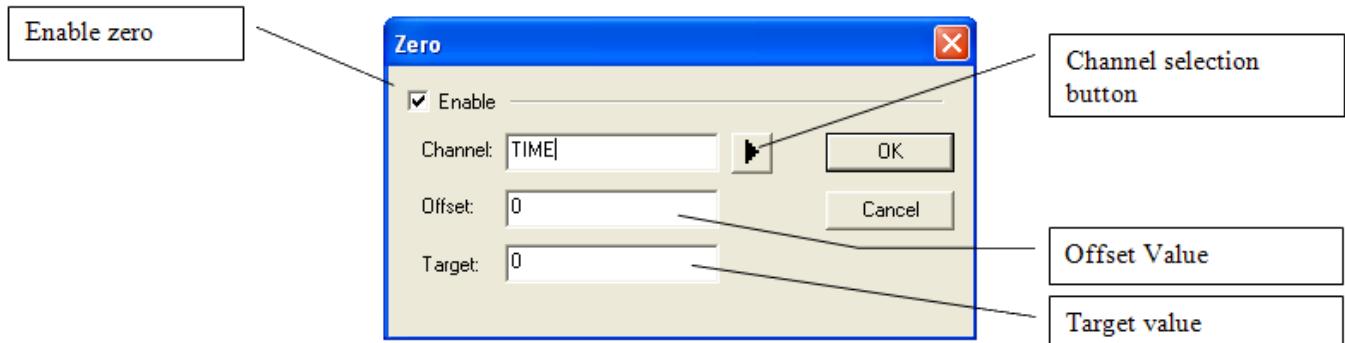
## FDL page

From this page you can configure the Fast Data Logging settings. For more details see the *FDL* section.

## Zeros page

From this page you can define target zeroing values or offsets for specific channels to be manually programmed when connected to the logger via the *Data Logger Channel Window*.

To insert a channel, select *Edit/Insert/Zero* or click on the right hand mouse button and select *Add Zero* (or drag from another page), then write or select the name of the channel with its zero value.



Channels are zeroed from the *Data Logger Channel Window* (*View/ Data Logger Channel Window*) when the connection to the data logger is active (*Data Logger/Activate Channel View*). Select *Data Logger/Set Zeros* to apply zeroing.

Only channels that have the *Enable* flag checked can be zeroed; this allows you to zero a particular subset of channels while leaving the remaining offsets unchanged.

### Clear offset

Select *Clear Offset* on the right hand mouse button to remove all the offsets which have been configured in the zeros page. This command only operates on the table; it does not update the channels in the data logger. To apply any changes you must re-transmit the table to the logger.

## Trigger page

According with the Data Logger configuration you can configure ones triggers that condition the data logger operation.

The *Acquisition trigger*, required for all system, determines when the logger will record data.

The pre-trigger and post-trigger durations are defined in integer seconds with maximum values of 3 and 20 respectively.

The *High frequency trigger* determines when the logger will switch to the additional high frequencies that can be defined for each channel.

The pre-trigger and post-trigger durations may be defined in two manners, according to the Data Logger configuration:

1. integer seconds with maximum values of 3 and 20 respectively
2. tenths of second with maximum values of 5 and 10 respectively

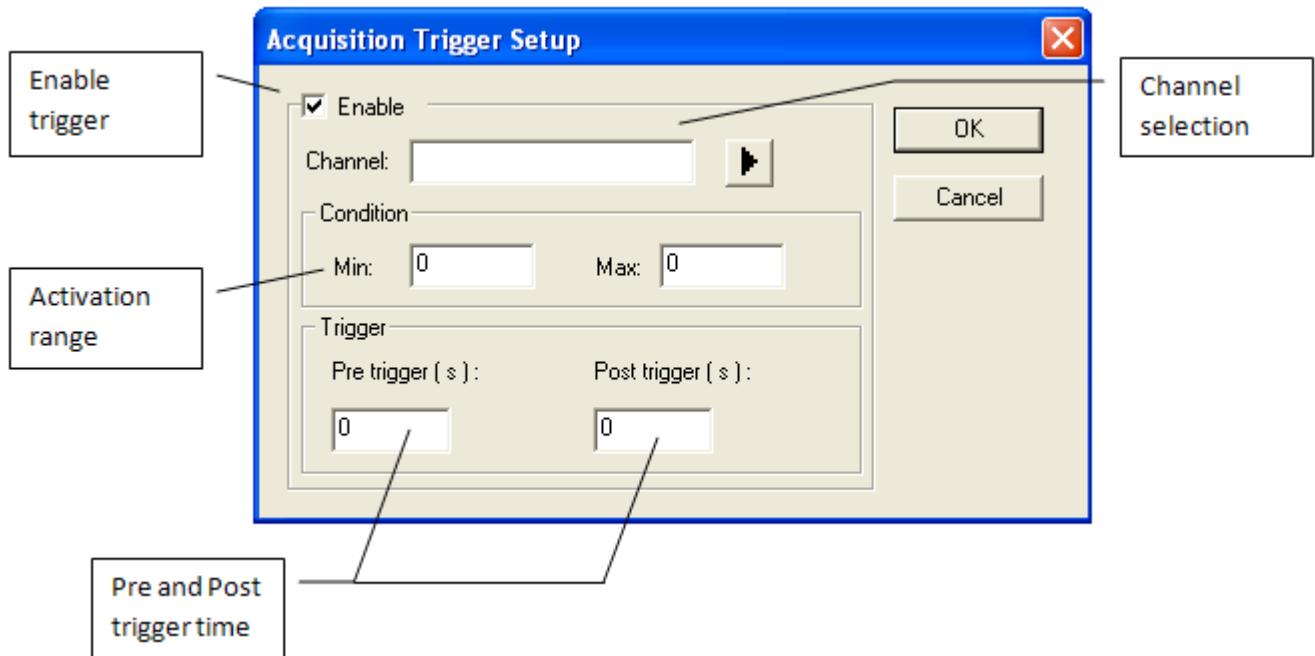
The Cable Event may substitute the previous one; it determines an event as defined in section. (See Multiple Data Rate section)

The pre-trigger and post-trigger durations are defined in tenths of second with maximum values of 5 and 10 respectively.

The DST Event determines an event as defined in section. (See Multiple Data Rate section)

The pre-trigger and post-trigger durations are defined in tenths of second with maximum values of 1 and 10 respectively.

To insert a trigger, click on the right hand mouse button and select *New*; then write or select the name of the channel.



If no acquisition trigger is defined the logger will record continuously when powered up.

The trigger conditions are programmed in the logger only when the *Enable* flag is checked.

## Dashboard

From this page you can configure Dashboard settings. For more details see the *Dashboards* section.

# Channel Properties

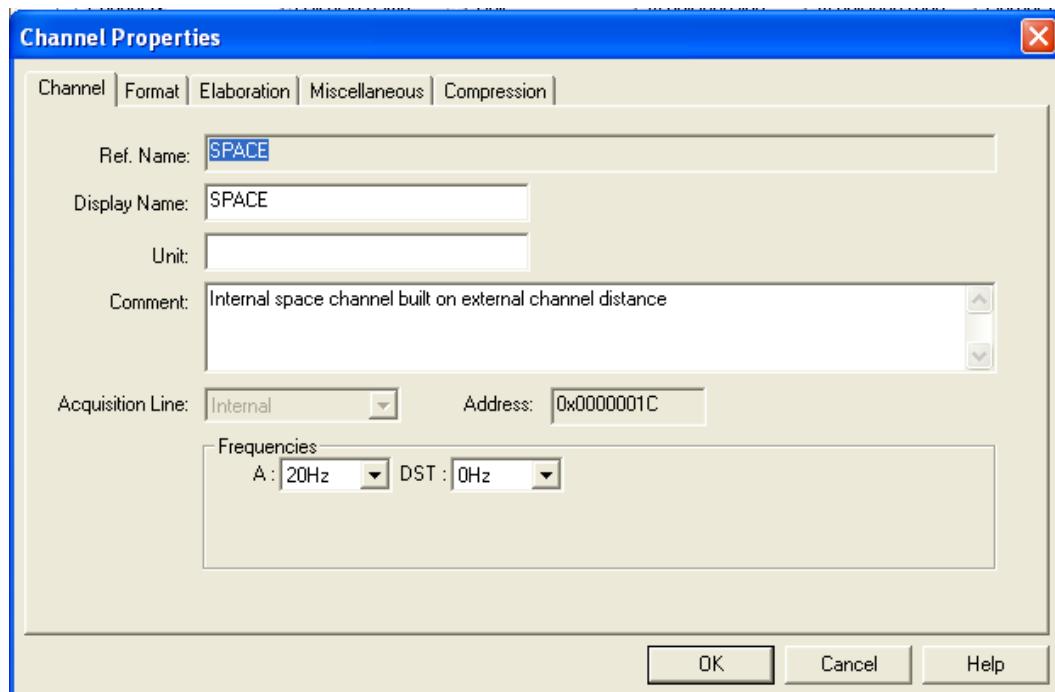
Double click or select *Edit/Channel Properties...* on any channel (or group of channels) to open the properties dialog. The channel properties dialog has the following configuration tabs:

Page	Configuration
Channel	General channel data (name, units, comment, acquisition line, logging frequencies)
Format	Logging data type, display format and number of decimals
Elaboration	Elaboration routine applied to the channel
Miscellaneous	Membership of user-defined groups
Compression	Choose alphabet for channel
Dashboard	Channel label for dash display, refresh frequency, end-of-lap freeze enable flag (this page is not available when a dashboard of type MDU03 or MDU02 is selected, because dashboard channels configuration is already performed using left pane in Table window with these types of dashboard)

In the *single edit* mode, the properties dialog shows the data of the single selected channel. In the *multiple edit* mode, some restrictions apply:

- Channel Names and Acq. Data Type cannot be edited
- The data that are the same for all the selected channels are displayed normally (*defined value*). The data that differ within the selected channels are displayed on a light-grey background without a displayed value (*undefined value*). Undefined data modified by the user become defined data.

## Channel

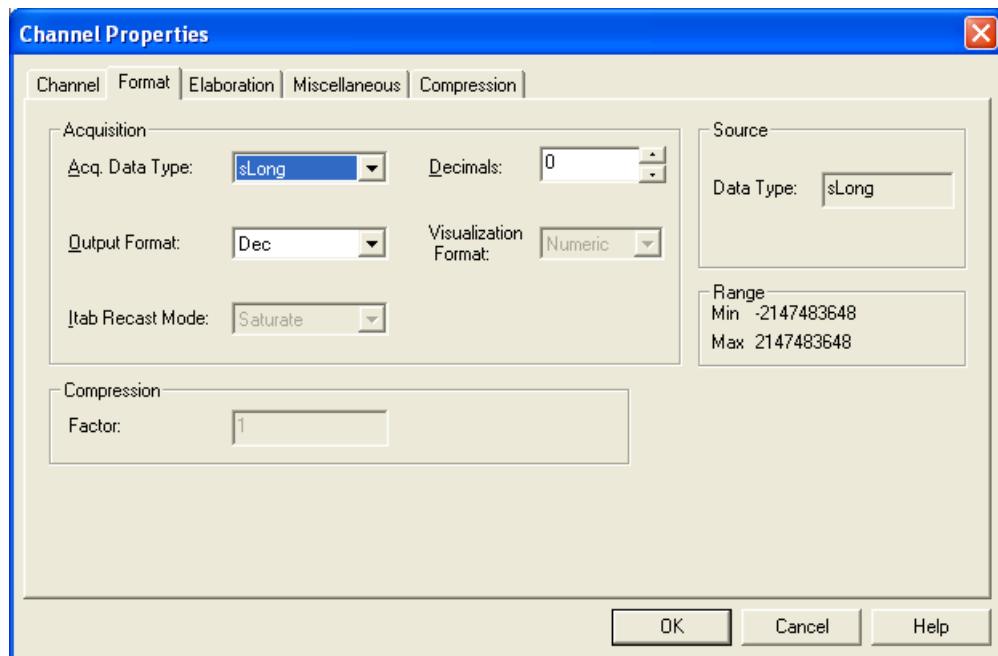


Reference Name	Original channel name (in the CLX library)
Display Name	channel name, can be edited by user
Unit	unit measure for channel
Comment	comment associated to channel
Acquisition Line	physical communication line from which channel values are logged
Address	physical address of channel on data logger device

## Frequencies

A	Standard frequency selection
B	Trigger frequency selection
DST	Data Stream Telemetry frequency selection
NBT	Narrow Band Telemetry frequency selection

## Format



### Acquisition

Acq. Data Type	data type used to store raw values logged for the channel
Output Format	format used to visualize channel values
Decimals	number of decimals for channel value
Visualization Format	Numeric or Scientific format for Float Output Format

### Source

Data Type	original data type for channel raw values acquired from data logger
-----------	---

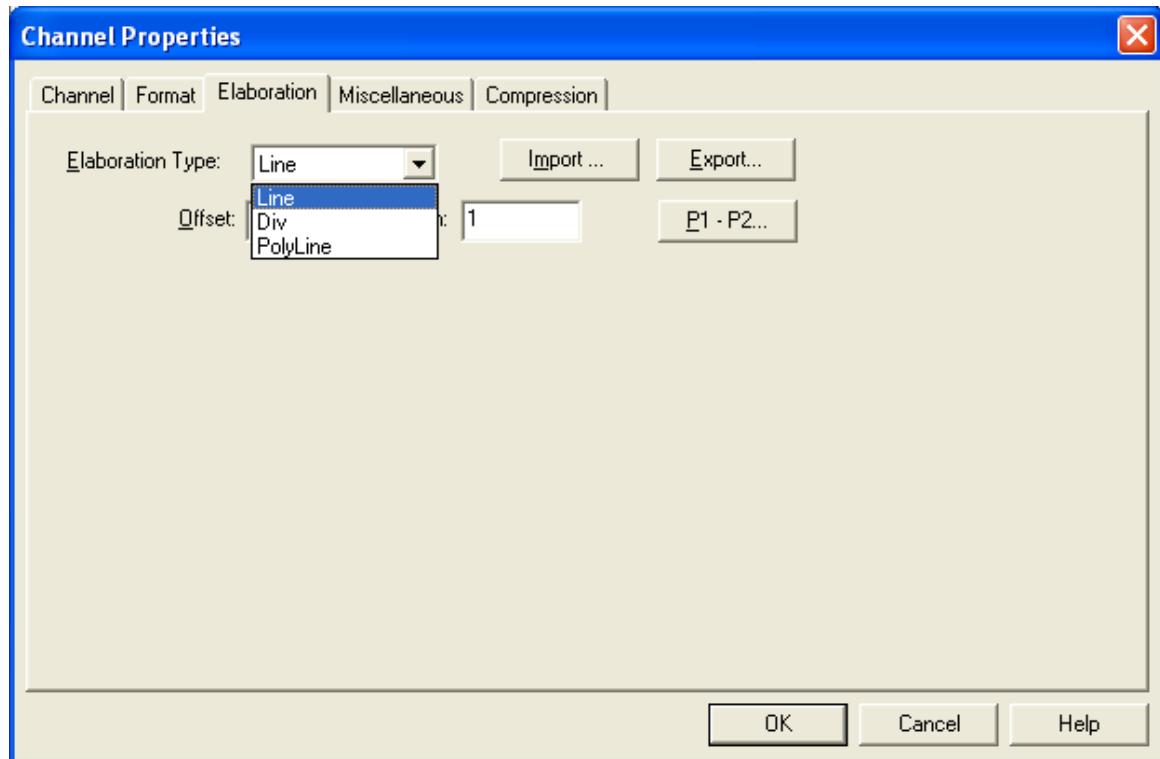
### Compression

Comp. Factor	Compression Factor for channel values
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### Range

Min / Max	The max range value allowed with this data type
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## Elaboration



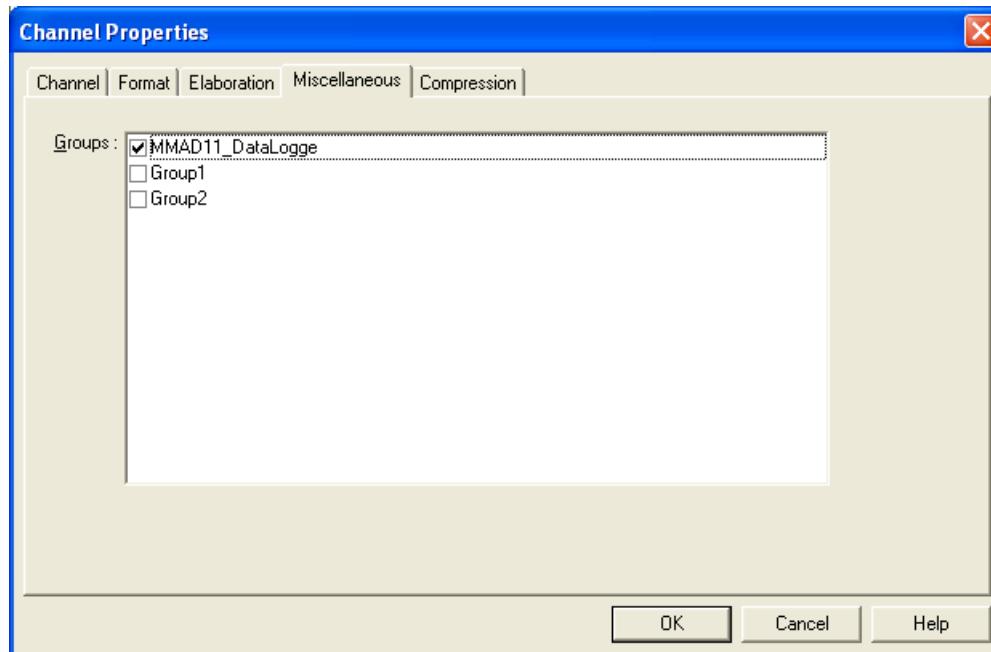
User can choose in list Elaboration Type several types of elaborations for channel raw values logged from data logger.

<i>Line</i>	A standard linearization can be applied (Gain in unit per V or mV, and offset in V or mV, depending on the input). If the gain & offset are unknown, it is also possible to define it by two points, X being in V or mV, and Y being in the desired output unit – the gain & offset are then automatically calculated.  
<i>Div</i>	The constant specified by user is divided by the channel raw value

<b>PolyLine</b>	<p>For non-linear sensors, the Polyline enables to define a table of conversion points between the input &amp; output (table of 16 Breakpoints max). The input must be expressed in correct values (0 to 5000 for channels in mV or 0 to 5.000 for channels in V), and the output can be expressed in any value in the desired output unit (decimals can be used). [If you are unsure about the input values, start with no elaboration and check in DLView the type of measurements that you get.] The input values must be in increasing order!</p> <p>The values are interpolated between the defined points, and don't change when below the first or above the last point.</p>
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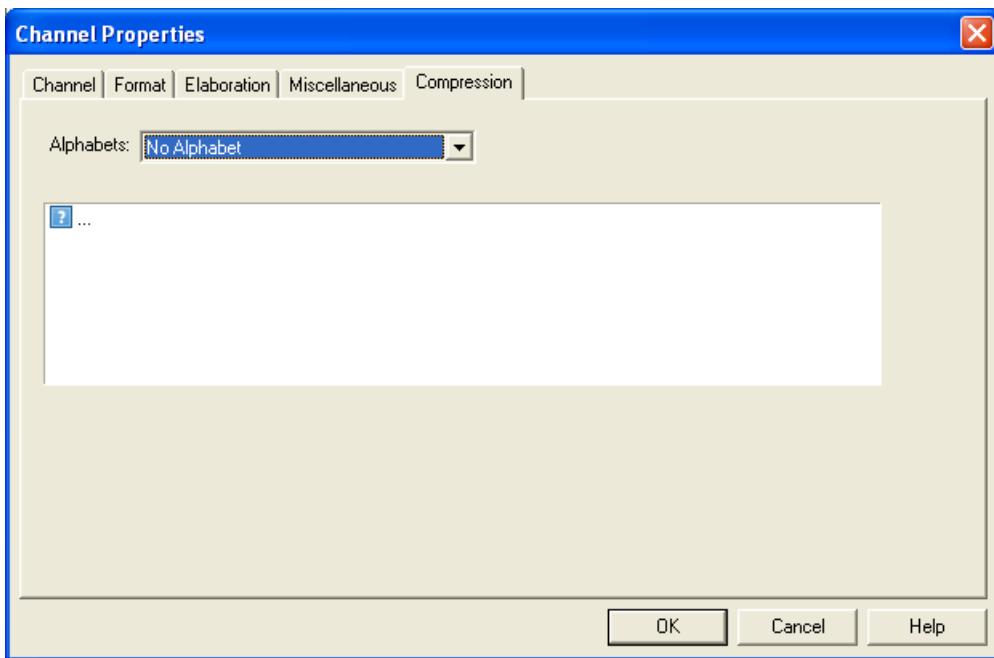
The Import and Export buttons are used for importing and exporting the settings of the current elaboration to a CSV file. The exported file will be placed in the “<EXE Path>\Data Logger\Elaboration Libraries” subdirectory.

## Miscellaneous



The list Groups shows all groups available for table. Check on the left of each item indicates if channel belongs to correspondent group.

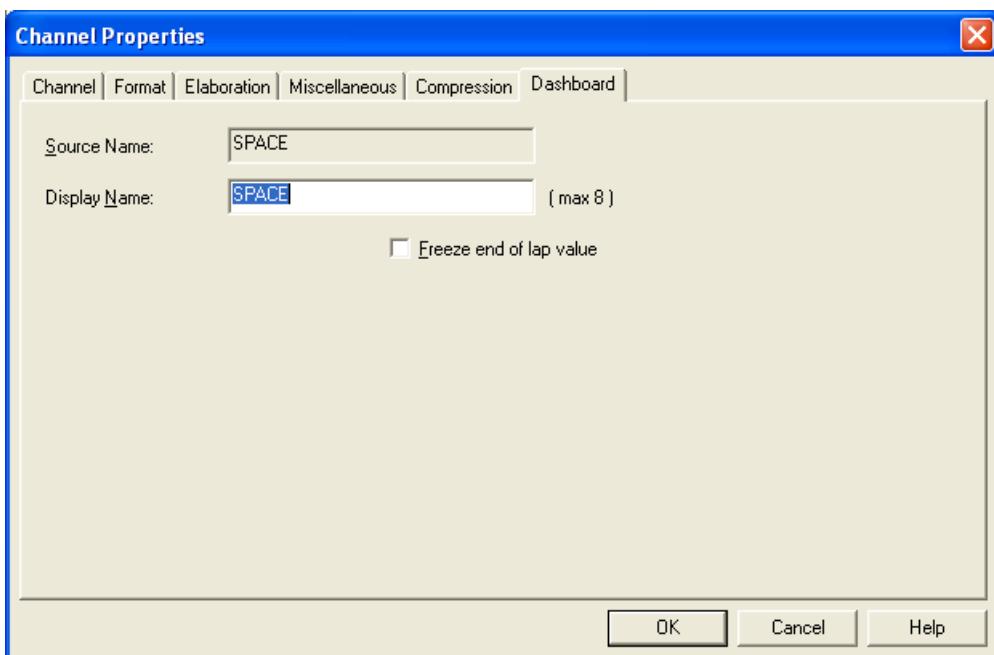
## Compression



Combo *Alphabets* lists Alphabets configured for the table and allows to select an alphabet compression to use for channel values. Information and descriptions relative to selected Alphabet are displayed in the item below *Alphabets* combo.

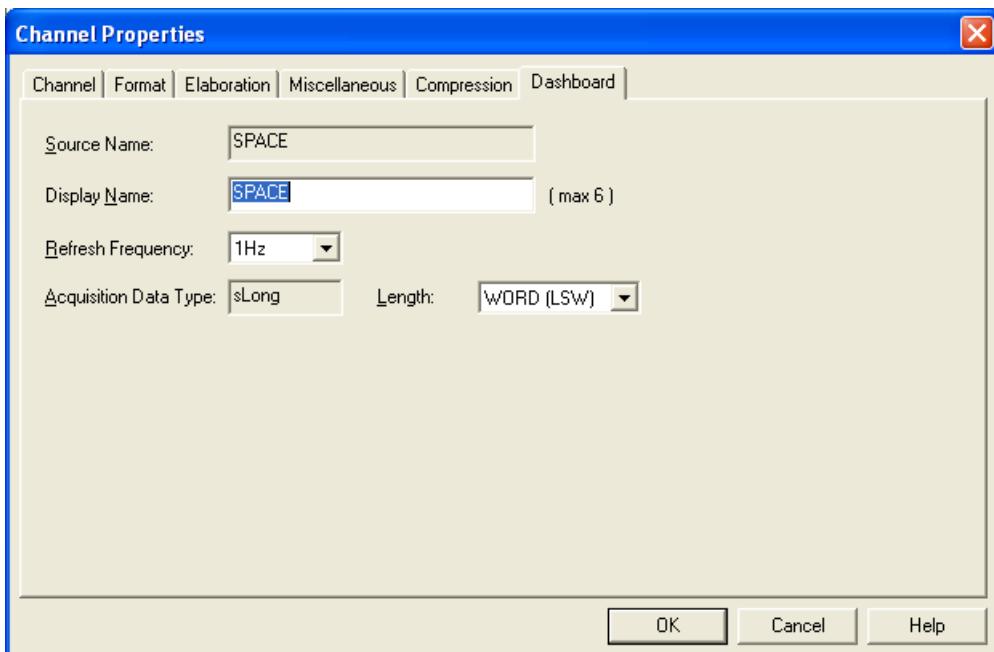
## Dashboard

This page slightly differs, depending upon which type of dashboard is selected. For dashboards of type HDU01 or DDU01 page layout is as follows:



<i>Source Name</i>	Original channel name
<i>Display Name</i>	Name displayed on dashboard for the channel
<i>Freeze end of lap value</i>	Enable freeze of channel value at end lap

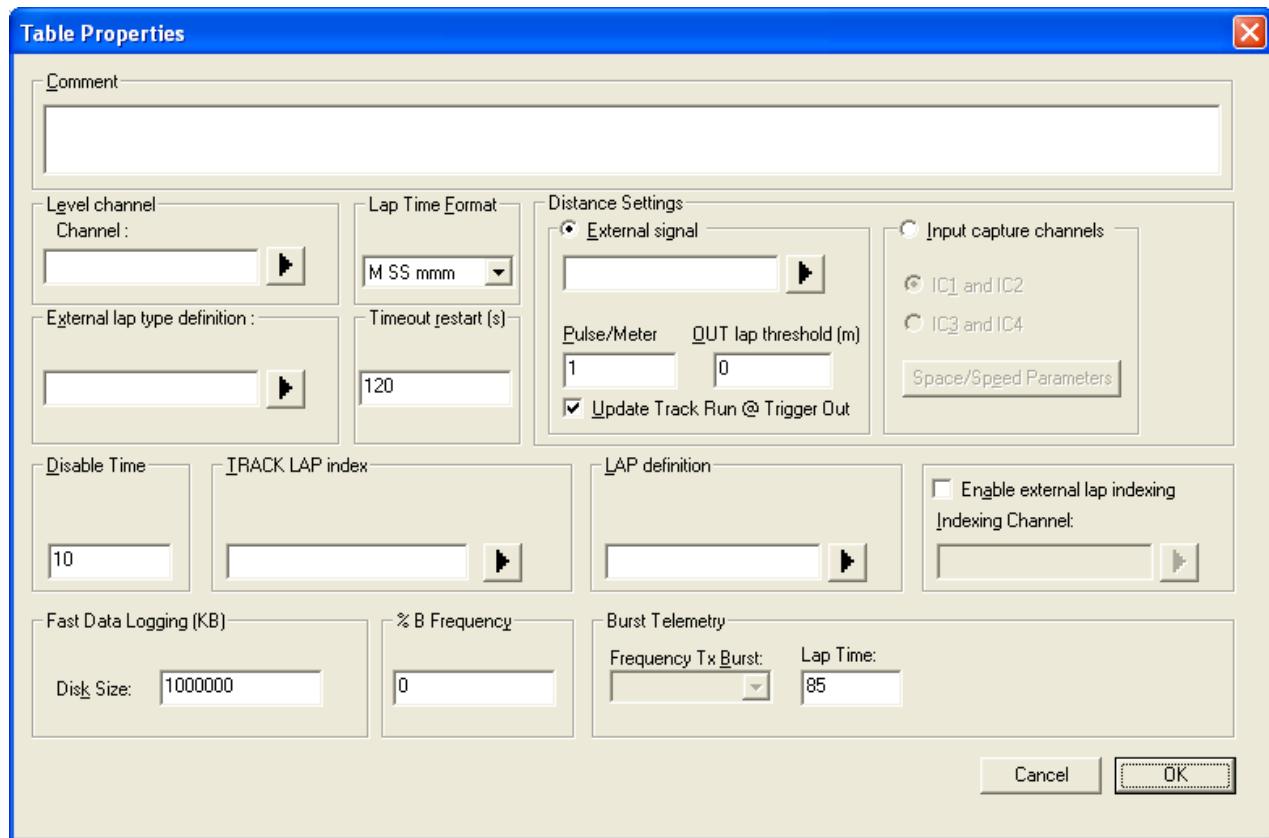
For dashboards of type MT940 page layout is as follows:



<i>Source Name</i>	Original channel name
<i>Display Name</i>	Name displayed on dashboard for the channel
<i>Refresh Freq</i>	Frequency for channel value refresh on dashboard display
<i>Acq. Data Type</i>	Shows channel acquisition data type
<i>Length</i>	Allows to select channel data length

# Table Properties

TPX table properties are a collection of parameters, which control the way the data logger operates once it has been programmed. To edit the table properties, select *DataLogger/Table/Table Properties...*, window *Table Properties* will appear, divided into several frame sections.

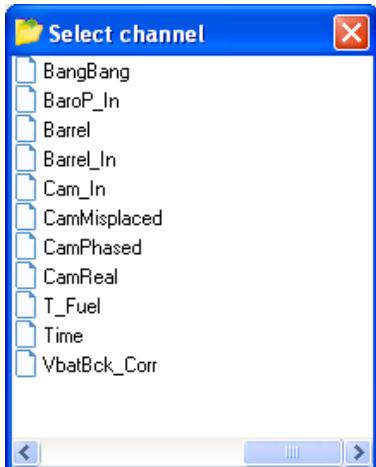


## Comment

Allow you to write a comment describing the logging table.

## Level channel

Used to calculate end of lap level and fuel consumption in lap header. To configure a channel, push the arrow button on the right side and select an item from the list in the *Select Channel* window that will appear.



### Lap Time Format

Select a format in the list for Lap Time display.

### Distance Settings

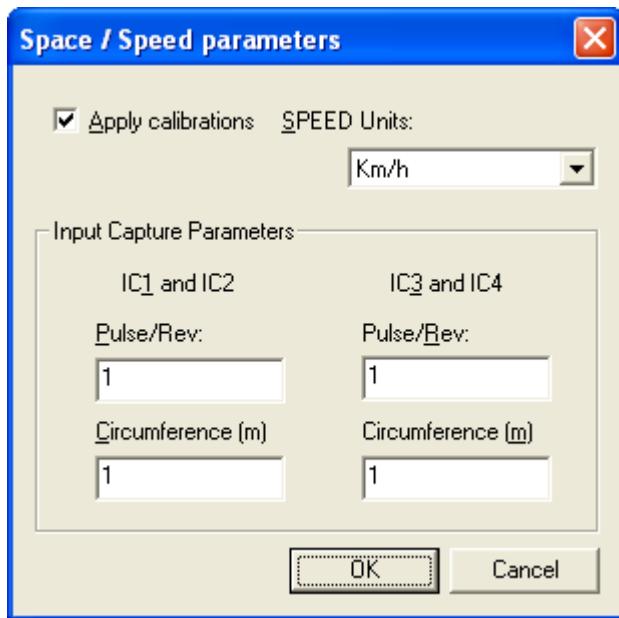
Select a mode for configure Distance:

#### External Signal (default)

Distance channel	The channel defined in this section is used by the Data logger to determine start/end of lap (falling edge) and to identify coverage zones for buffering DST data
Pulse/Meter	Define the value for Pulse/Meter
OUT lap threshold (m)	Define the value (in meters) for Out lap threshold
Update Run @ Trigger Out	Enable Track Run updating when Trigger Out condition occurs.

#### Input capture channel channels (available only for Marvel dataloggers).

IC1 and IC2	select input capture source 1 and 2
IC3 and IC4	select input capture source 3 and 4
Space/Speed Parameters	Open the window for configuring Space/Speed Parameters



Apply calibrations	Enable applying calibrations
SPEED units	Select measure unit for Speed
Input Capture Parameters	Set values of Pulse/Rev and Circumference for each input capture

### External lap type definition

Value of selected channel is used to determine the type of lap (=Road, =Special).

### Timeout restart (s)

Logger waits for this time before restarting after Ethernet link is lost (may be useful to set this value high when using wireless Ethernet connection).

### Disable Time

Mask time for beacon input after valid code is detected (applies independently for each code if more than one is handled).

### TRACK LAP index

Select channel for TRACK LAP index.

### LAP definition

Configure settings for Lap definition: Beaconing Channel and Indexing Channel.

### Fast Data Logging (kB)

Disk size (in kB) reserved for Fast Data Logging.

### % B Frequency

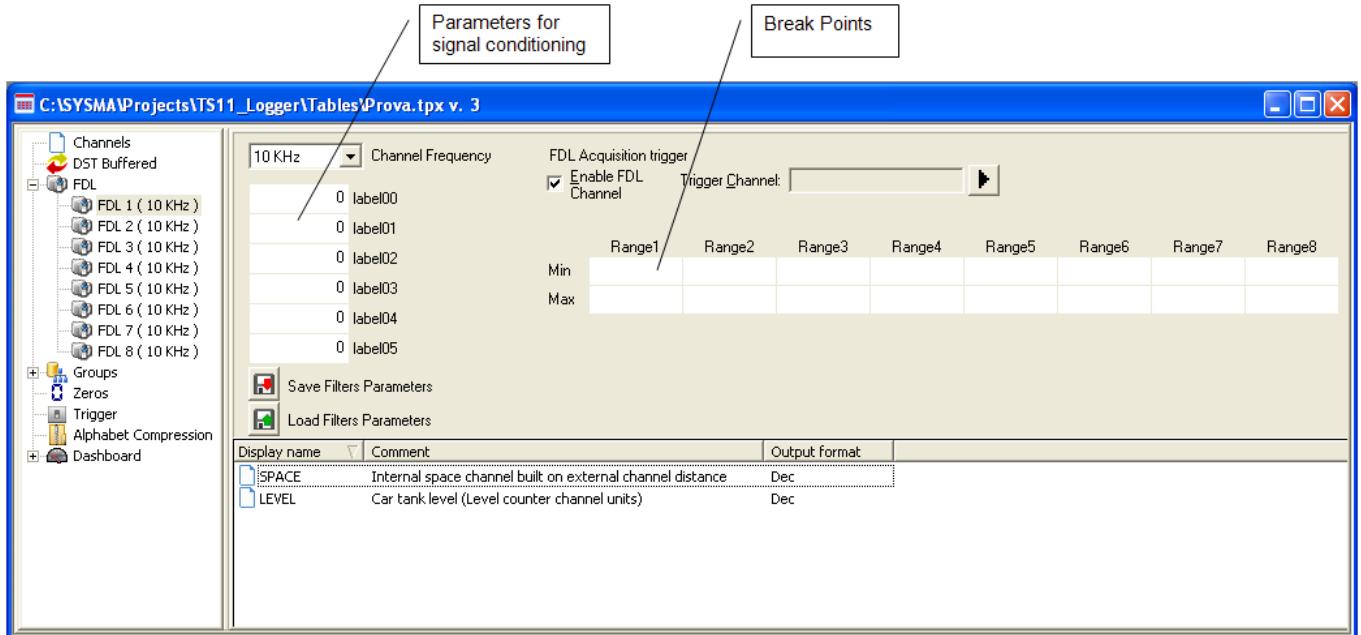
This parameter is used to calculate memory duration on the basis of logging frequencies for double frequency systems.

### Burst Telemetry

Freq. Tx Burst	Set burst telemetry transmission rate
LapTime	Used to estimate burst Tx time (together with Freq. Tx Burst)

# Fast Data Logging

Fast Data Logging (FDL) main node in tree on left pane groups 8 items, correspondent to Fast Data Logging channels. Select an item to access configuration for Fast Data Logging channel.



## Channel Frequency

Allows to select Fast Data Logging frequency. Available frequencies are:

1. 10 kHz
2. 20 kHz
3. 50 kHz
4. 100 kHz
5. 250 kHz

## Parameters for signal condition

A set of parameters that will be supplied by Marelli but can be changed for sensor adaptation. The parameters are:

1. DAC1Offset
2. DAC2Offset
3. PGAGain
4. FilterGain
5. FilterCutOffFreq
6. ADSampleRate

*Channel Frequency and Parameters for signal condition* can be saved and loaded from an .FDL file, using buttons *Save Filters Parameters* and *Load Filters Parameters*.

A single file will contain the parameters for all Fast Data Logging channels; when the user loads an .FDL file SYSMA prompts a warning. Parameters loaded from .FDL file will be set for all Fast Data Logging channels.

### **FDL Acquisition trigger**

<i>Enable Channel</i>	<i>FDL</i> Enable Fast Data Logging Channel
<i>Trigger Channel</i>	Channel used as trigger for Fast Data Logging channel.  Select trigger channel from the pop up list that opens with a click on arrow button on right hand.
<i>Break Points</i>	The user can define up to 8 activation ranges.
<i>Range(i), Min, Max</i>	A consistency check is performed; eventual sequence error will be displayed in red.

### **Subset of standard channels**

A subset of normal channels (maximum 8) can be configured in this list. These channels will be written at 20 Hz within the FDL files to allow a manual synchronization with the rest of the database.

To add a channel in this list, Drag & Drop on Fast Data Logging channel item in the tree on left pane or use standard Copy command.

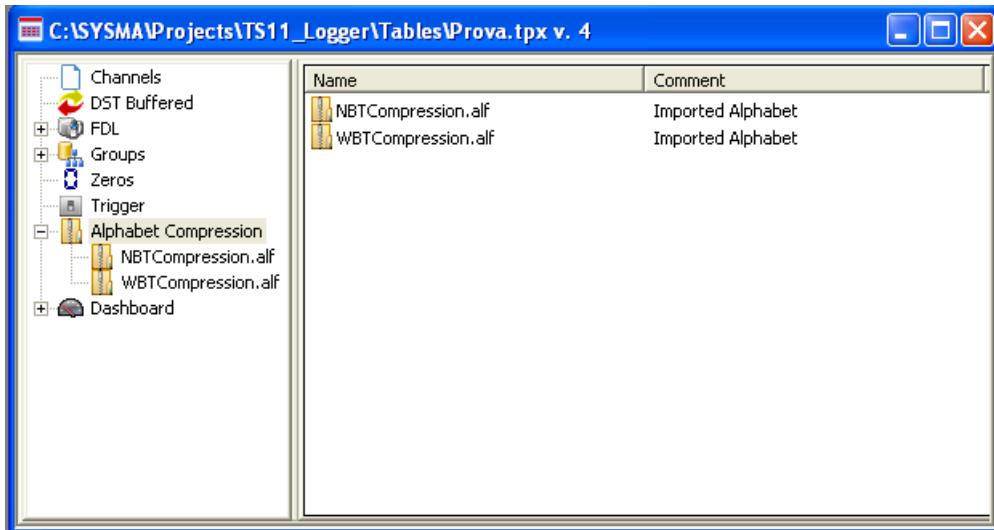
# Alphabet Compression

This feature allows reduction in data storage size, using a method that compresses data logged and then decompresses data stored before channel values are displayed.

Information needed for Alphabet Compression is written in .ALF files, provided by vendor.

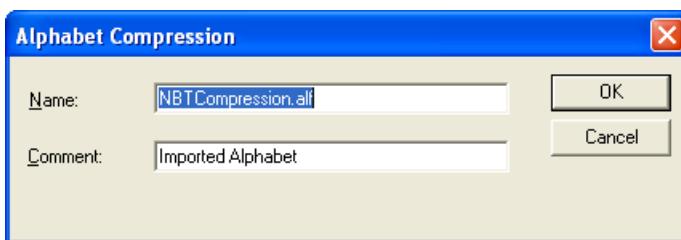
It is possible to configure several .ALF files in a table .TPX, and associate them to channels to which apply Alphabet Compression.

Selecting main Alphabet Compression node in tree of left pane in Table window, all .ALF files configured in table are listed in the right pane, displaying file name and comment associated.



It is possible to import and export .ALF files, using commands from *DataLogger/Acquisition Table Editing/Compression Alphabet/Import alphabet compression* in main menu.

To view or edit properties of each .ALF file, select correspondent item in the list and open popup menu with mouse right click.



Selecting a single Alphabet Compression item in the tree of the left pane, right pane lists all channels using that .ALF file for data values compression.

Display name	Unit	Acquisition line	Acquisition type	Output format
LapStartTime	Internal	uLong	Dec	
LAPLEVEL	Internal	sLong	Dec	
LAPDISTANCE	Internal	sLong	Dec	

To associate an .ALF file to a channel, add it in the list using standard Drag & Drop or Copy commands, or configure channel properties in page *Compression* of *Channel Properties* setup window.

## Channels Treating

SYSMA can handle the different types of channel acquisition lines. Hereafter you can find the description of the SYSMA procedures and then a short description of the acquisition protocols is given for completeness.

### Logging ARCNet channels

In the Arcnet lines. The data transfer from the ECUs to the TS10 data logger is possible via three different protocol modalities; each one is characterized by his own complexity and efficiency. In fact the basic protocol is simple and not efficient; the latest protocol is efficient and quite complex. In some cases it may be convenient to maintain the simple protocol (e.g. for interfacing with third party systems) paying on efficiency and throughput.

SYSMA is compatible with the three levels of ARCNet protocol so far implemented into Step10 system. Only one protocol is applied per line and some keys present in the Device Description (.DEV) system file identify it.

In the TS10 data logger there are two ARCNet lines labeled as "ARCNet1" and "ARCNet2". They can be configured independently from the other one but it is very important to check the compatibility with the functionality of the TS10 software release implemented (see compatibility).

### ARCNet keys

SYSMA needs the following keys in the Device Description (.DEV) file:

ARCNet mode

The program section of the Device Description (.DEV) file must contain the keys 'ARCNet\_Line1\_Mode' and 'ARCNet\_Line2\_Mode' which define the protocol used for each line:

ATP0  
ATP1  
ATP2

If the content of these keys is different from one of the above, SYSMA will give an error message when loading the Device Description (.DEV) file and will prevent channels from being copied into the TPX table until the keys are corrected.

If these keys are not present in the Device Description (.DEV) file SYSMA will not allow channels to be copied into the TPX file.

### **ARCNet line**

A second important key is 'ARCNET LINE' that must be defined for each box. This key indicates which ARCNet line a particular box is connected to and therefore which protocol it uses. It may take the values 1 or 2 (numeric).

### **ARCNet Node**

This key defines the ARCNet address (hex) of the particular box and has to be defined within each box section. This key is used in the ATP2 protocol to address the single iTAB.

### **ARCNet Unit offset**

This key specifies the position (in term of offset) of the data block for a specific ECU. This key is used only for ATP1 protocol mode and it has to be inserted in the unit (ECU) definition within the Box section.

### **Example**

```
[Program]
ARCNet_Line1_Mode=ATP1
ARCNet_Line2_Mode=ATP2
```

```
[Box0]
ARCNET
ARCNET NODE=0xfa
LINE=2
...
AddLabel0=SH7055
AddDA0=0x0F0
ARCNetUnitOffset0=0x0550
```

### **ATP0 protocol**

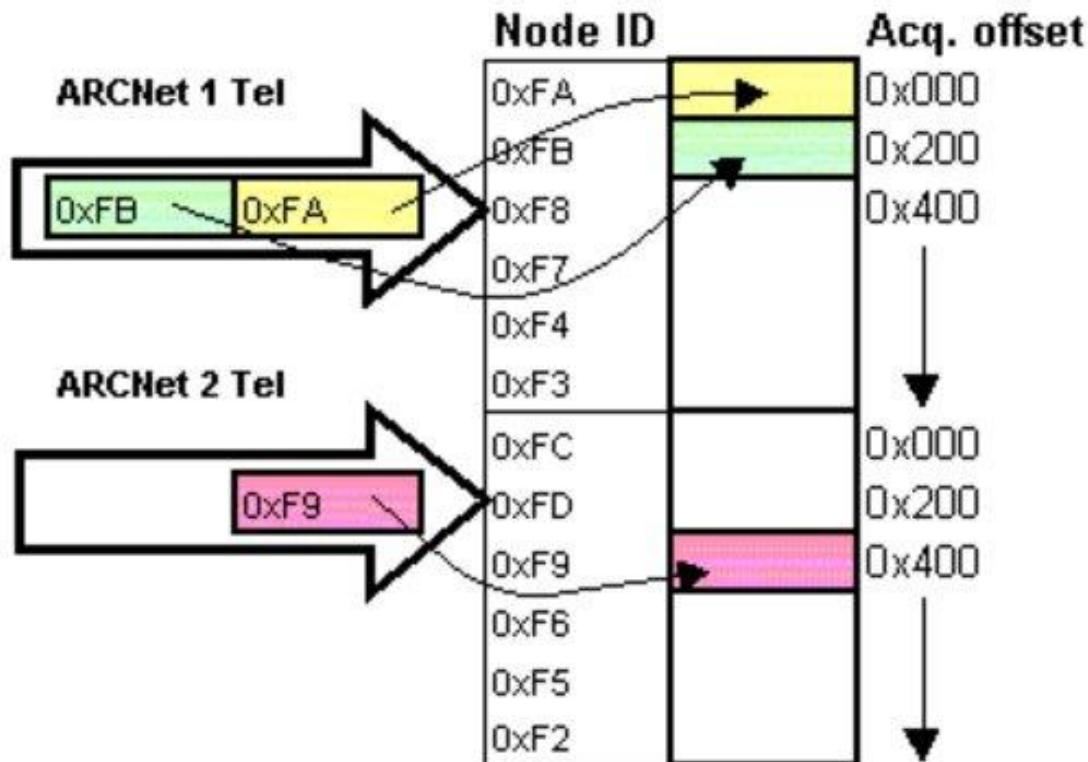
According to ATP0, each ARCNet frame contains a fixed sequence of channels originated by the single unit (micro-processors) of the specific box. The frames are no variant and therefore all variables are sent at maximum rate, independently by the effective sampling rate. The total traffic of each line conditions the maximum number of channels to be acquired.

In TS10, each acquisition line has an own buffer where all the received frames are copied. The relative position of the given frame depends on the source node ID. The single channel is

addressed by the offset defined in the CLX file; this offset is absolute and it is related to the starting point of the entire buffer. This involves that channels from a given box must use only certain ranges of offset as shown below. The relative position of a channel within the frame is hard-coded in the box software.

When a channel acquired via Arcnet is copied from the channel list library (CLX) to the logging table (TPX) it is referenced by the acquisition offset written in the CLX file.

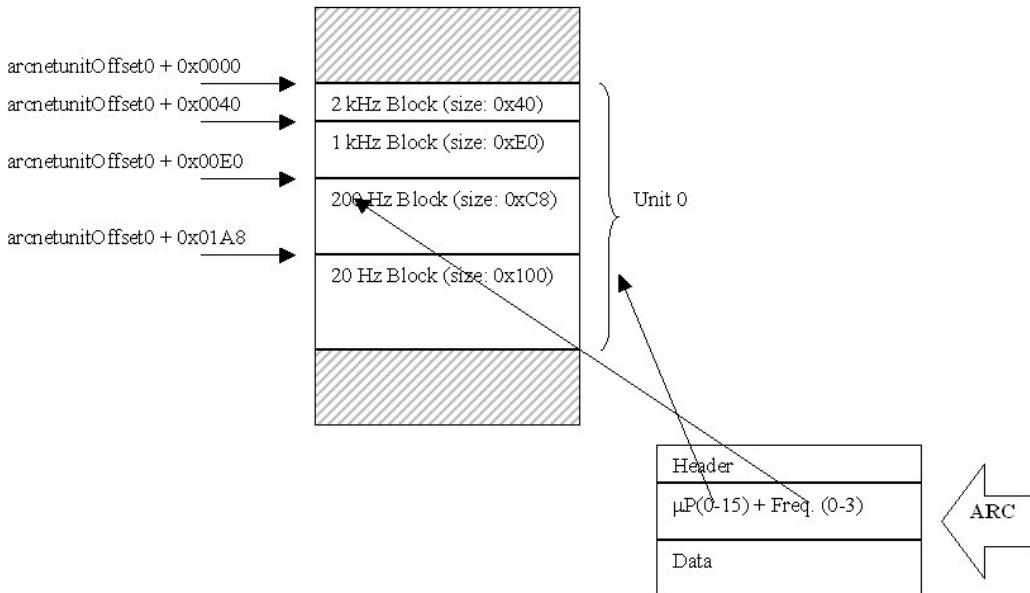
In the following example all channels transmitted by Step10 Master\_veh (ARCNET NODE = 0xFA) must have acquisition offsets in the CLX file within the range [0x000...0x1FF].



### ATP1 protocol

ATP1 is a smart evolution of the ATP0. The significant improvement introduced by ATP1 is the fact that channels data are sent via Arcnet according to logging frequency; this reduces the line load. This is implemented by the distribution over a macro time-slot of the channels having a lower sampling rate.

ATP1 pre-defines the data structure; in fact the software reserves a fixed amount of memory per each ECU and it imposes a maximum number of ECUs per Box. The data buffer is structured as shown in the following scheme:



As indicated, there are four different acquisition frequencies and sixteen possible ECUs.

The ARCNet packets carry several blocks, which correspond to a specific subset of variables identified by:

Particular frequency value (2kHz, 1kHz, 200Hz, 20Hz)

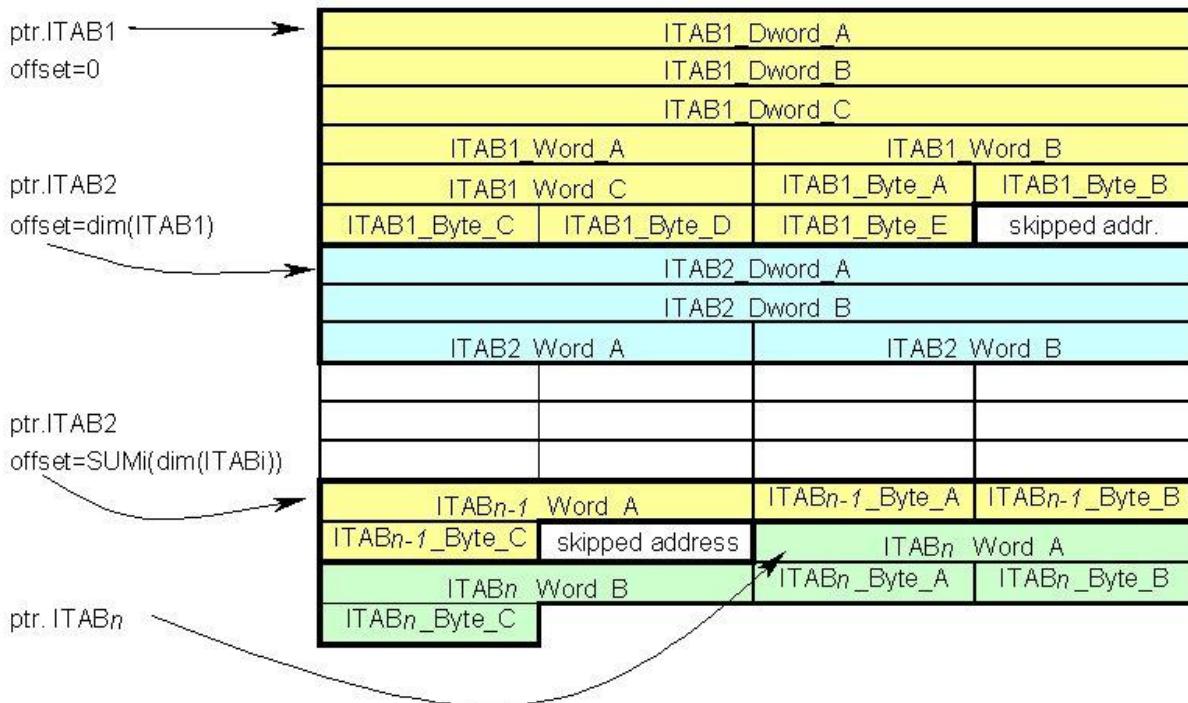
ECU source mPs (0 , 15)

The internal mapping of the blocks is hard coded in the ECU software. The maximum sampling rate of a variable is defined by this limitation. I.e. if a variable is mapped in the 20Hz area, there is no possibility to increase it in the logger side.

The logger receives the blocks from the ECUs and it places them in the position indicated by the ARCNUnitOffset, values stored in the Device Description (.DEV) file. When copying an ARCNet channel from the channel list library (CLX) to the logging table (TPX), SYSMA reads from the Device Description (.DEV) file the ARCNet line index of the associated box to establish the associated protocol. If the protocol is ATP1, the software calculates the channel offset adding the ARCNUnitOffset to the channel-offset specified in the .CLX. SYSMA also checks the correctness of the unit offset and the frequency of each channel.

## ATP2 protocol

ATP2 is aimed to overcome the blocks size limitation imposed by ATP1. The main idea behind this target is to make the block definition adaptive; SYSMA is in charge of creating several sub tables, ECU/Frequency-dependent. All the offsets are calculated at the table creation stage. Another consistent improvement introduced by this protocol modality is the effective acquisition frequency assignment: the ECUs will be automatically programmed with the maximum acquisition frequency needed. The ATP2 protocol uses an additional key in the Device Description (.DEV) file ('ARCNET NODE') for each box to specify the physical address of the box on the ARCNet line. This parameter is needed when migrating from ATP1 to ATP2. When copying an ARCNet channel from the channel list (CLX) to the logging table (TPX), SYSMA copies all the parameters from the CLX except for the line index (ARCNet1/2); this is taken from the Device Description (.DEV) file. The block offset is calculated automatically internally and the user has to refer each channel via its "Absolute Address" or "Offset in static table" as required. In parallel with the creation of the T98 logging table, SYSMA calculates the sub tables used to configure the single ECU. These tables are named iTAB and define the mapping structure of the different blocks. The data logger acquisition buffer is organized according to the iTAB structure shown below:



There is still a maximum bound in the dimension of the blocks that is 255 words. SYSMA checks the conformity of the table (release 1.23 or newer).

## HDLC

The HDLC lines are 4. When inserting a HDLC channel in the acquisition table, SYSMA copies the address and the index from the .CLX. The acquisition frequency is hard coded and the sampling frequency doesn't affect it.

Sysfile is aimed to modify the parameter, in fact SYSMA cannot write the .CLX file. This is the straightest way to proceed, since the parameters interested have to be under control of the ECU software manager.

## CAN

The CAN lines are 4. The TS10 receives CAN packets from the Boxes and places them in a particular position determined by the source box signature.

When inserting a CAN channel in the acquisition table, SYSMA copies the address and the index from the .CLX. The acquisition frequency is hard coded and the sampling frequency doesn't affect it.

## Internal, InternalDpg, AnalogDiff, AnalogSE and Digital

The internal variables are directly addressed by the TS10 that uses the memory addressing specified in the .CLX file. There are no extra communication layers and therefore there are no problems on the efficiency of the acquisition. When inserting an internal channel in the acquisition table, SYSMA copies the address from the .CLX. The acquisition frequency is at the same time the sampling frequency.

# Managing Tables

## Drag & Drop a channel within the same table

SYSMA allows you to drag one or several channels from one page of the table to another. This logically includes the channel or channels in the destination table and sets the related channel property to a default value, i.e. dragging a channel from the channels page to one of the telemetry pages (Burst, RealTime or DST) sets the telemetry transmission frequency to 1 Hz.

SYSMA does not allow you to drag from any page to the Channels page because this page already represents all the channels included in the table.

## Drag & Drop + Copy & Paste from table to table

SYSMA allows you to open several tables simultaneously and, as a result, to copy channels from one table to another.

Channels may be copied by dragging them with the mouse or via the clipboard by using the Edit/Copy (Ctrl+C) and Edit/Paste (Ctrl+V) commands.

Copying a channel from a table to another means adding or overwriting the selected channels and, if the copy is produced on a page different from Channels, it means copying the channels as described in the preceding paragraph. In addition to channels, you may copy Triggers and Zeros.

It is possible to drag and drop a full dashboard configuration from one table to another. You must drag the dashboard's main tree node from the source table to the destination table.

Dashboard configuration drag & drop operations are only allowed if:

- The 2 tables have the same kind of dashboard
- The destination table doesn't have a dashboard

## Checks performed during channel copy

SYSMA runs a series of checks each time one or more channels are copied to the table. These checks are based on the characteristics of the data logger as defined by the keys in the Device Description (.DEV) file. If a check fails an error or warning message is displayed.

## Ordering and searching

Click on the column headers to order the channels according to the related property.

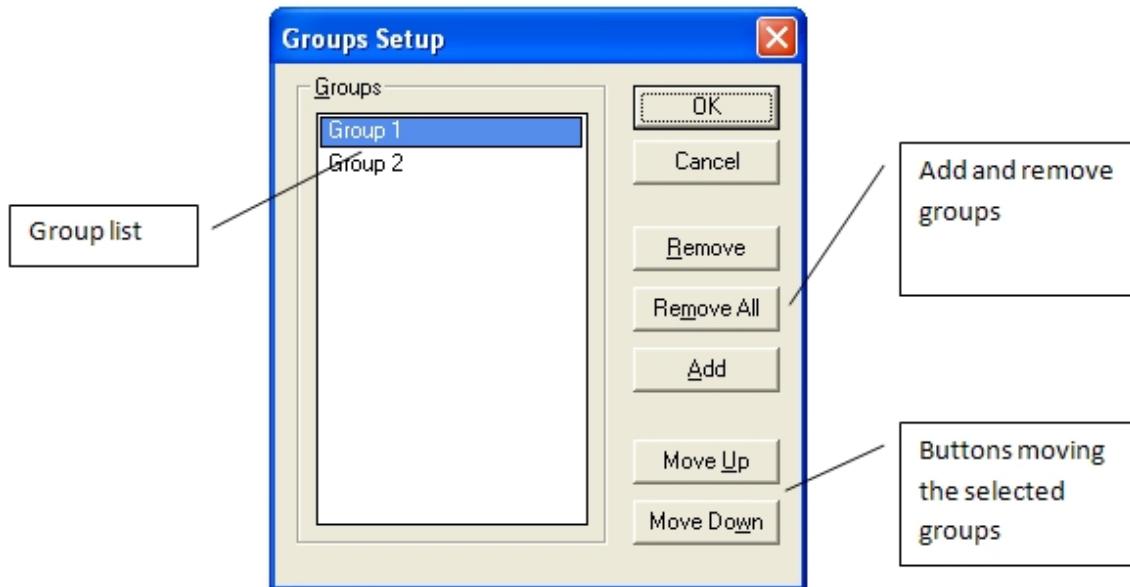
Note that the actual order in which channels are saved in the tpx file (transmitted to the logger and displayed in *DataLogger Channel Window*) is determined partly by the logging rate and partly by the order of insertion in the table.

## Context menus

Click the right mouse button to view the context sensitive command menu.

## Groups of channels

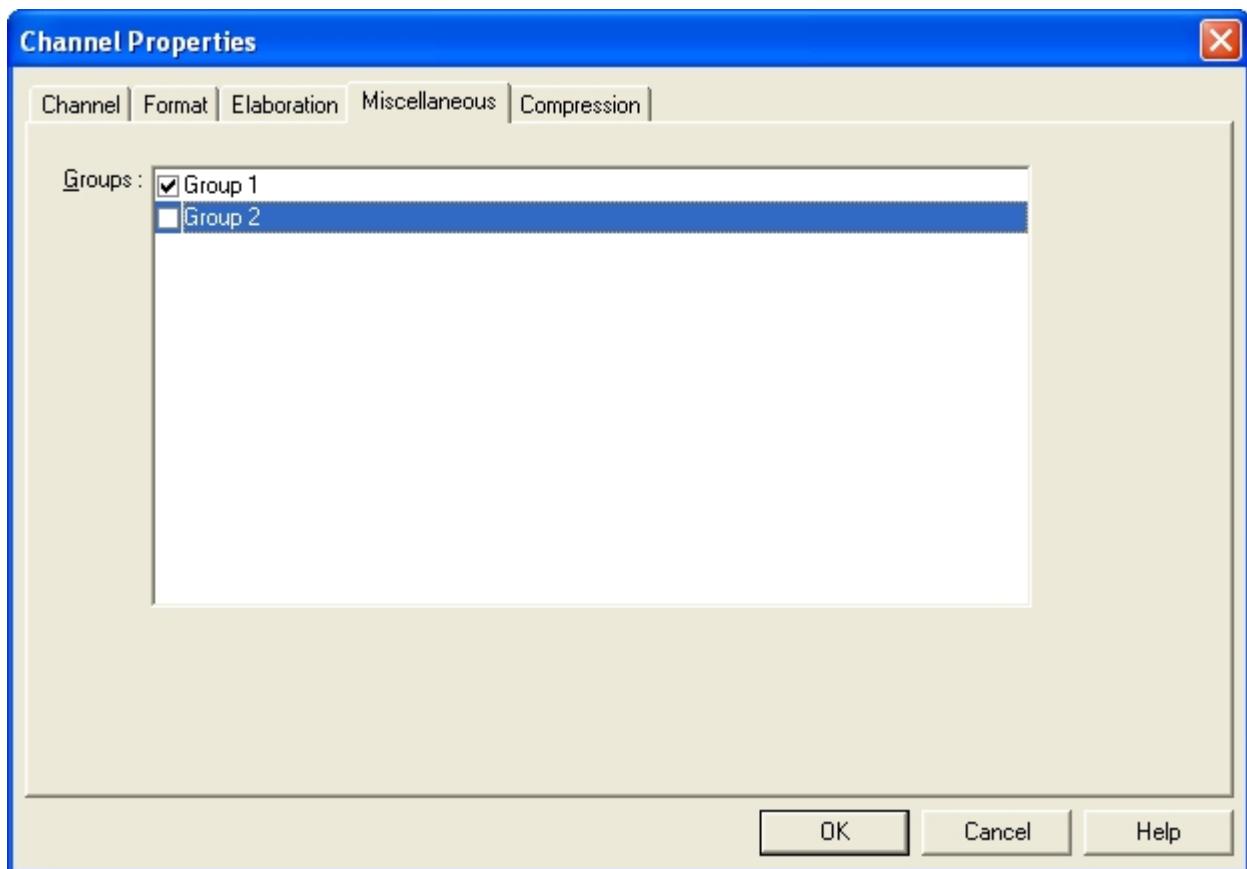
You may configure up to 16 groups in each table. To enter a group, select *DataLogger/Acquisition Table Editing/Group Setup...*



<i>Remove</i>	<i>Remove the selected group from the list</i>
<i>Remove All</i>	<i>Clear all groups from the list</i>
<i>Add</i>	<i>Add a new group to the list click on any item to edit the group name</i>
<i>Move Up/Down</i>	<i>Change the order of groups in the list</i>

## Associating a channel to a group

To associate a channel to a group, modify its properties (*Edit/Channel Properties* or press Enter). After opening the configuration window, select the Miscellaneous tab:



If the group name is checked, it means that the channel/s are part of the group; otherwise they are not part of it. SYSMA uses the groups as a filter within the *DataLogger Channel Window* window. *DataLogger Channel Window* may be configured to display only certain channels. If the name of a group is selected as a filter, *DataLogger Channel Window* will display only the channels, which are part of the selected group.

## ■ Partial Time Configuration

### Configuration Settings

Partial time configuration is available in the left tree list selecting the node “Partial Time”. The presence if this node in the list depends by the device’s hardware features.

N.	SPACE	REF.TIME(mm:ss:000)	Lap TIME(mm:ss:000)
			59:59:999

- Use Best Lap Times
- Clear Best Lap after download
- Use Latest Best Lap if LAP TIME is identical
- Use Internal Value

Available fields are:

<b>Channel</b>	<b>Description</b>
N.	The maximum number of rows is 16.
SPACE	Distance breakpoints
REF.TIME	Partial times in the format minutes:seconds:milliseconds
Lap Time	Lap reference time

Available check box:

<b>Field</b>	<b>Description</b>
Use best lap time	Updates the REF.TIME value if the current lap is the best lap.
Clear best lap after download	After a download, resets the REF.TIME fields to the table values.
Use latest Best Lap	If the current LAP TIME is identical to the best lap time, the partial times LAP TIME are identical are updated to the current lap values.

To delete a row you must select it and press the DEL (CANC) key or use the right-click contextual menu with the “Delete” command.

## **Acquisition channels**

In the logger are available the following channels:

<b>Channel</b>	<b>Description</b>
<b>Partial_en</b> (Space - Partial Time Status)	Partial Time's activation code. If it isn't equal to 0, the partial times are enabled.
<b>ParTime</b> (Partial Time - Actual Partial time)	Current Partial Time value.
<b>RefTime</b> (Partial Time - Reference time)	Partial Time value user for Reference Time: it's the breakpoint value configured in the table.
<b>Diff_RefTime</b> (Partial Time - Difference Reference time)	Difference between Partial Time and Reference Time
<b>BestTime</b> (Partial Time - Best time)	Partial Time value for the best time: it's the breakpoint referred to the current best lap time.
<b>Diff_BestTime</b> (Partial Time - Difference Best time)	Difference between Partial Time and Best Time.
<b>IdealTime</b> (Partial Time - Ideal time)	Partial Time for the Ideal Time: it's the best Partial Time for that breakpoint.
<b>Diff_IdealTime</b> (Partial Time - Difference Ideal time)	Difference between Partial Time and Ideal Time.

# Generic CAN Environment

## Purpose and functionality

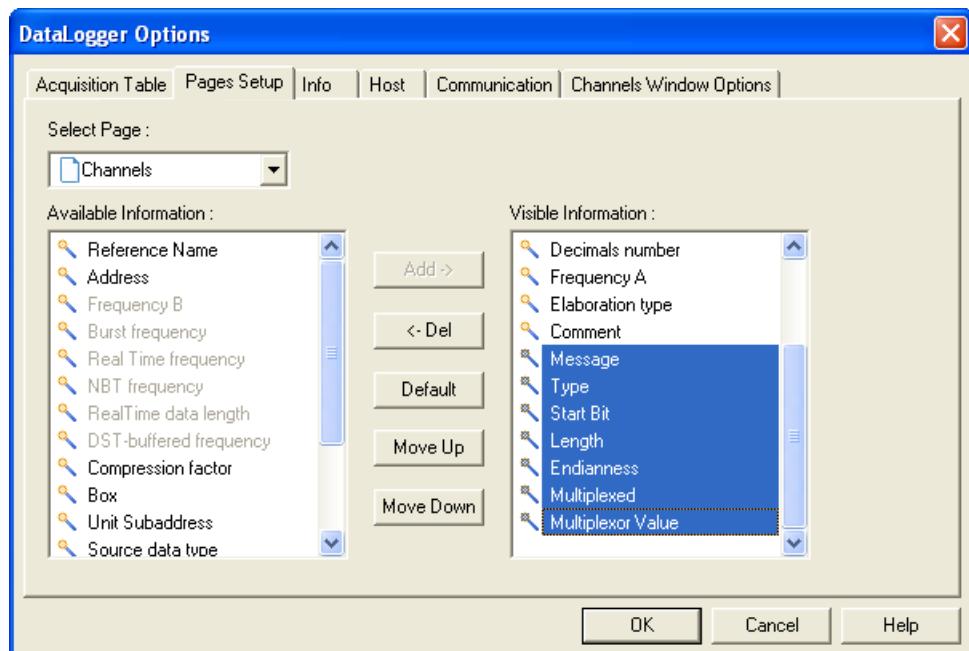
The generic CAN management allows you to acquire the channel's samples extracting them from the CAN packet in a more-flexible manner compared to the standard CAN channels.

The generic CAN channels are defined *CAN Signals*.

The generic CAN environment can be enabled by the Device Description file (.DEV) and depends on the connected hardware.

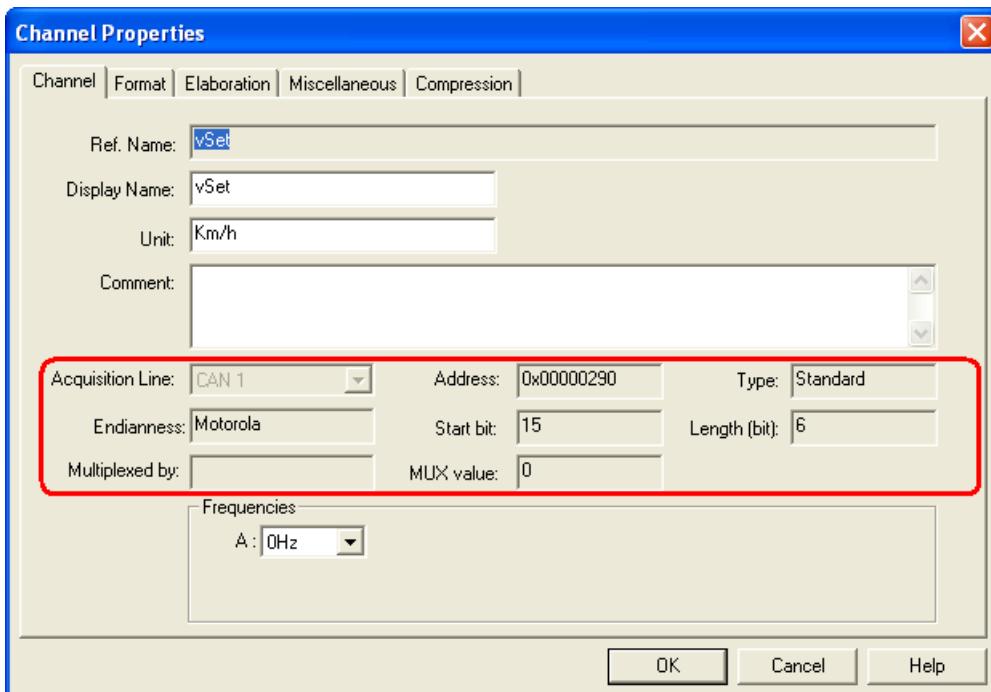
In the left side tree a new node called “Messages” is shown, it contains all the CAN messages relative to the Generic CAN acquisition. The CAN Signals can be recognized in the right side table by the column “Acquisition Line” checking the suffix “(Sign)”.

In the *Data Logger Options* page some new fields are available for adding information to the channel's tables:



## CAN Signal Features

In the CAN Signal's property pages are available the specific parameters of this kind of channel:



The CAN Signal's specific parameters are:

Parameter	Description
<b>Acquisition Line</b>	It is the acquisition line: from CAN1 to CAN4. Depending by the hardware in use, a fewer number of acquisition lines can be available
<b>Address Type</b>	Standard ( 0x0000 – 0x07FF ) Extended ( 0x0000 – 0x1FFFFFFF )
<b>Address</b>	ID for belonging Messages
<b>Endianness</b>	Intel (lsb) / Motorola (msb)
<b>Start bit</b>	Offset in bits of the data sample from the packet start (from 0 to 63)
<b>Length</b>	Length in bits of the data sample (from 1 to 32)
<b>Multiplexed By</b>	Signal multiplexor
<b>MUX value</b>	Multiplexing value

The CAN Signal's configuration parameters are not editable in the TPX table but are available only in read-only mode. To define the packet's geometry configuration you must edit the CLX library. Like all the other type of channels you can anyway set the channel's acquisition frequency, the elaboration type and the other common parameters.

## Notes about the acquisition frequency

A CAN signal belongs to a CAN Message that is acquired to a certain frequency that is common to all the signals belonging the same message. It is possible to setup a frequency independent for every signal but its value and acquisition frequency will depends by the real reception of the belonging message on the CAN line.

## Adding CAN Signals from the CLX library

The CAN signals can be added to a table by importing from a CLX library.

Three different visualization modes are available for the CAN Signals items:

- 1) Standard table list:

The screenshot shows a software window titled "SYSMA Database - Data Logger - Sample CLX GENCAN.CLX: 630 Symbols". On the left, there is a tree view with nodes: Measurements, Calibrations, Acquisition Lines, CAN Signals (which is expanded), and Messages. The main area is a table with the following columns: Display Name, Acq.Line, Acq.Address, Data Type, Acq.Type, OutFormat, and Dec. The table lists 630 entries, all of which have "CAN 1 (Sign)" in the Acq.Line column. The entries include DiagRes1\_NAB through Digit\_06. At the bottom left of the table area, it says "630 Object(s)".

Display Name	Acq.Line	Acq.Address	Data Type	Acq.Type	OutFormat	Dec
DiagRes1_NAB	CAN 1 (Sign)	0x07DA	uLong	uLong	Dec	0
DiagRes1_NSP	CAN 1 (Sign)	0x07D8	uLong	uLong	Dec	0
DiagRes1_NAP	CAN 1 (Sign)	0x07D7	uLong	uLong	Dec	0
DiagRes1_NBS	CAN 1 (Sign)	0x07D5	uLong	uLong	Dec	0
DiagRes1_NPE	CAN 1 (Sign)	0x07D4	uLong	uLong	Dec	0
DiagRes1_NAG	CAN 1 (Sign)	0x07D2	uLong	uLong	Dec	0
DiagRes1_NPP	CAN 1 (Sign)	0x07CF	uLong	uLong	Dec	0
DiagRes1_NCL	CAN 1 (Sign)	0x07CA	uLong	uLong	Dec	0
DiagRes1_NVB	CAN 1 (Sign)	0x07C9	uLong	uLong	Dec	0
DiagRes1_NPG	CAN 1 (Sign)	0x07C8	uLong	uLong	Dec	0
DiagRes1_NIT	CAN 1 (Sign)	0x07C7	uLong	uLong	Dec	0
DiagRes1_NRR	CAN 1 (Sign)	0x07C5	uLong	uLong	Dec	0
DiagRes1_NVO	CAN 1 (Sign)	0x07C4	uLong	uLong	Dec	0
DiagRes1_NQS	CAN 1 (Sign)	0x07C3	uLong	uLong	Dec	0
TargetAddress4	CAN 1 (Sign)	0x07C0	uByte	uByte	Dec	0
TargetAddress3	CAN 1 (Sign)	0x07C0	uByte	uByte	Dec	0
TargetAddress2	CAN 1 (Sign)	0x07C0	uByte	uByte	Dec	0
TargetAddress1	CAN 1 (Sign)	0x07C0	uByte	uByte	Dec	0
Digit_01	CAN 1 (Sign)	0x075A	uByte	uByte	Dec	0
Digit_03	CAN 1 (Sign)	0x075A	uByte	uByte	Dec	0
Digit_02	CAN 1 (Sign)	0x075A	uByte	uByte	Dec	0
Digit_05	CAN 1 (Sign)	0x075A	uByte	uByte	Dec	0
Digit_04	CAN 1 (Sign)	0x075A	uByte	uByte	Dec	0
Digit_07	CAN 1 (Sign)	0x075A	uByte	uByte	Dec	0
Digit_06	CAN 1 (Sign)	0x075A	uByte	uByte	Dec	0

In this kind of view the CAN signals can be identified by the column “Acq.Line” if is present the suffix “(Sign)”.

- 2) List filtered selecting the node “CAN Signal”:

SYSMA Database - Data Logger - Sample CLX GENCAN.CLEX: 630 Symbols

630 Object(s)

	Display Name	Message	Acq.Line	Type	Start Bit	Length	Enc
	DiagRes1_NAB	CAN_07DA_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NSP	CAN_07D8_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NAP	CAN_07D7_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NBS	CAN_07D5_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NPE	CAN_07D4_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NAG	CAN_07D2_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NPP	CAN_07CF_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NCL	CAN_07CA_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NVB	CAN_07C9_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NPG	CAN_07C8_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NIT	CAN_07C7_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NRR	CAN_07C5_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NVO	CAN_07C4_S	CAN 1 (Sign)	Standard	39	32	mst
	DiagRes1_NQS	CAN_07C3_S	CAN 1 (Sign)	Standard	39	32	mst
	TargetAddress4	CAN_07C0_S	CAN 1 (Sign)	Standard	31	8	mst
	TargetAddress3	CAN_07C0_S	CAN 1 (Sign)	Standard	23	8	mst
	TargetAddress2	CAN_07C0_S	CAN 1 (Sign)	Standard	15	8	mst
	TargetAddress1	CAN_07C0_S	CAN 1 (Sign)	Standard	7	8	mst
	Digit_01	CAN_075A_S	CAN 1 (Sign)	Standard	47	4	mst
	Digit_03	CAN_075A_S	CAN 1 (Sign)	Standard	39	4	mst
	Digit_02	CAN_075A_S	CAN 1 (Sign)	Standard	35	4	mst
	Digit_05	CAN_075A_S	CAN 1 (Sign)	Standard	31	4	mst
	Digit_04	CAN_075A_S	CAN 1 (Sign)	Standard	27	4	mst
	Digit_07	CAN_075A_S	CAN 1 (Sign)	Standard	23	4	mst
	Digit_06	CAN_075A_S	CAN 1 (Sign)	Standard	19	4	mst

In this kind of view are shown only the CAN Signals and their parameters. It is possible to sort items by the column “Message” to group all the signals belonging to the same message.

### 3) List filtered selecting the node “Messages”:

SYSMA Database - Data Logger - Sample CLX GENCAN.CLEX: 630 Symbols

	Message Name	Acq. Line
	CAN_0286_S	1
	CAN_03C3_S	1
	CAN_0290_S	1
	CAN_0700_S	1
	CAN_071A_S	1
	CAN_028B_S	1
	CAN_03C0_S	1
	CAN_039A_S	1
	CAN_0380_S	1
	CAN_03C7_S	1

In this kind of view are shown all the generic CAN messages available in the CLX library. This list of messages is automatically generated by SYSMA from the signals presents in the table. This means that if you delete all the signals belonging to the same message, it will be removed from the list.

By operating on this items you automatically act on ALL the CAN signals belonging to that particular CAN message.

It is possible to import the CAN Signals into TPX tables with the usual operations:

1. Copy / Paste
2. Drag & Drop

Clearly, by operating of the items of kind "Message", **ALL the signals** belonging to that message will be copied into the destination TPX table. By copying a single CAN Signal depending from another one (Multiplexor) also the referred multiplexor signal will be automatically copied. Copy operation of one or more multiplexed signals:

The signals are not presents in the destination table	The multiplexor signal is automatically copied (even if it wasn't selected)
The signals are already presents in the destination table	Firstly is managed the multiplexor signal: 1) If the user chooses to overwrite it, all the operations proceed normally. 2) If the user chooses to NOT overwrite it, all the operations will be cancelled. Even then remaining multiplexed signals will not be processed.

The CAN signals channels are constrained by the hardware configuration. The limitations can be:

1. Maximum global number of signals
2. Maximum global number of Messages for CAN line

A warning message is displayed if one of these limits is exceeded.



In this case the maximum number of **signals** that can be acquired with the available hardware (25) was exceeded: you cannot add more signals to the table.



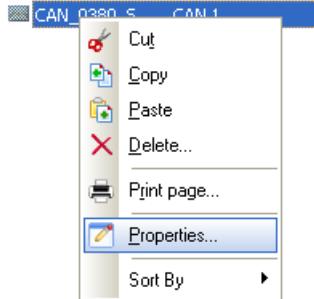
In this case the maximum number of **messages** that can be acquired on the line CAN1 was exceeded (5). You cannot add more Signals belonging to messages not present on the CAN1.

## Deleting CAN Signals

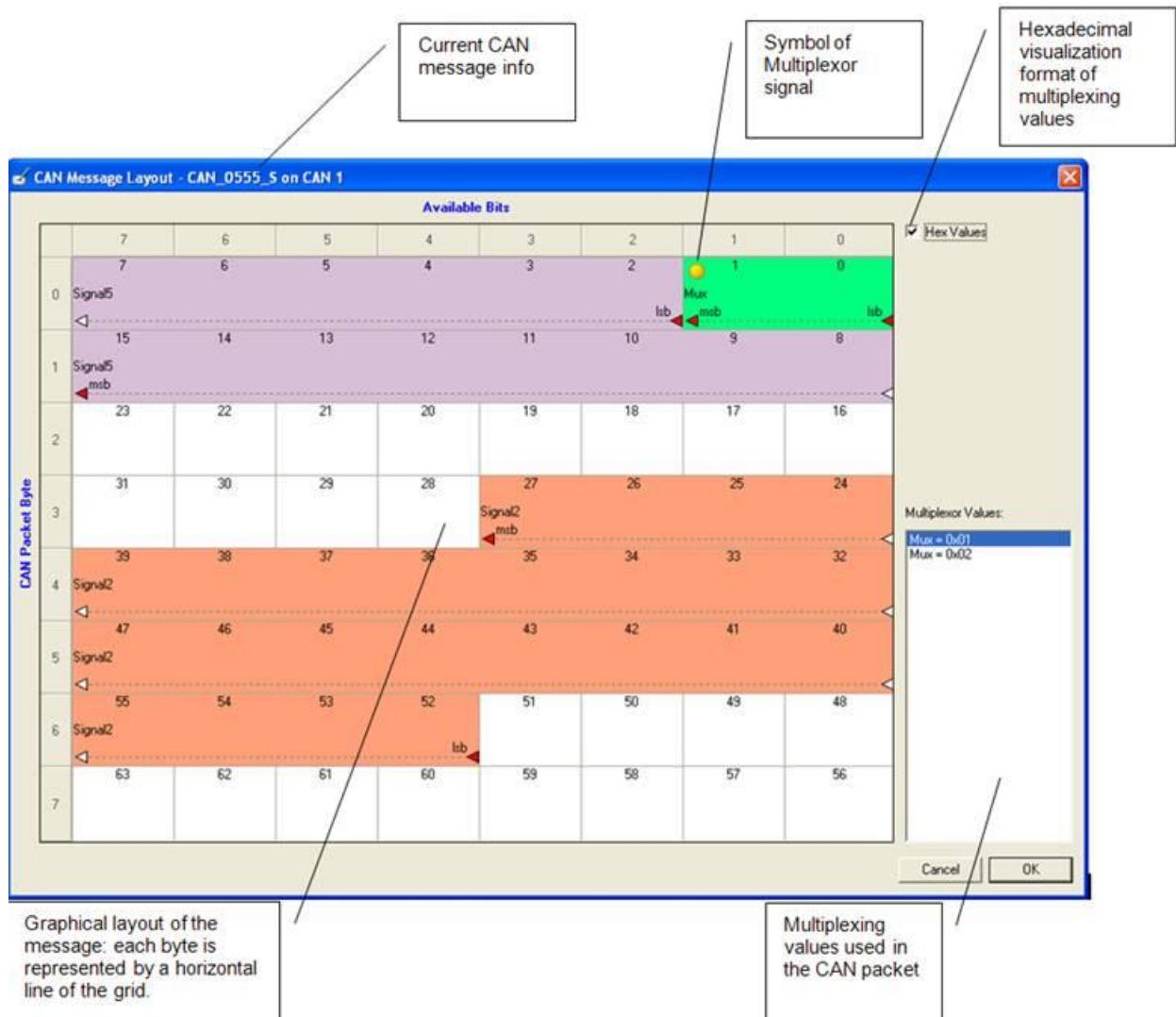
The CAN Signals can be deleted as single item or as entire message's signals. The rules applied are:

1. Deletion of a single signal: if it's a multiplexor for other signals, SYSMA will ask you to delete also all the multiplexed signals.
2. Deletion of a message from the message's page: all the signals belonging to the message will be deleted.

## The node “Messages” in the TPX tables

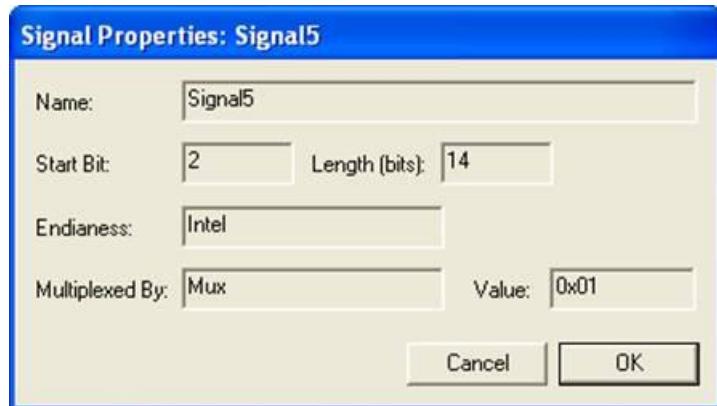


Double clicking on a message or by opening the CAN message's property page is possible to view, only in read-only mode, the graphical layout of the message.



In the grid are represented all the signals acquired in the CAN messages (in the sample image the message with ID = 0x555 standard on CAN1)

Double clicking on a signal his properties are presented in a textual form.



## Signals acquiring in “Multiplex” mode

The multiplex mode allows you to acquire the CAN Signals in different modality depending by the current value of a signal defined as “Multiplexor”. In concrete terms can be defined more than one map for the same CAN message, each map is referred to a value taken by the multiplexor signal.

In the same position of the packet can be placed more than one signal without generating overlapping problems, indeed they aren't present in the same time but only when the multiplexor's values is different.

On the right of the grid is available a list called “Multiplexor Values” where all the multiplexor's values defined in the packet are present. You can select an element of the list to view the graphical layout of the packet corresponding to the selected value of the multiplexor signal.

In the same packet can coexist multiplexed signal and not multiplexed signals. The not multiplexed signals are *always presents* in the packet (for example the multiplexor signal is, for definition, always present in the packet)

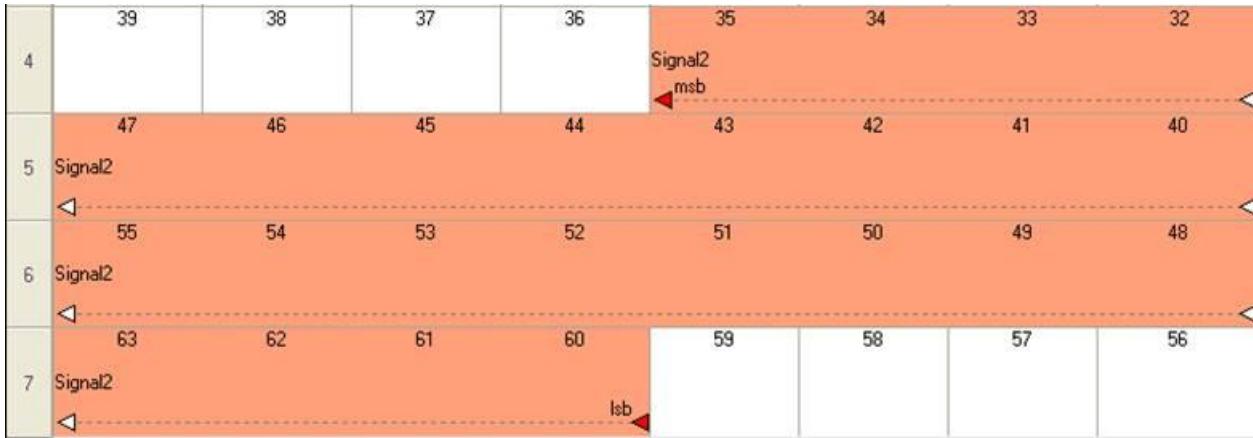
## Table of the symbols:

	Multiplexor signal
	Signal start
	Signal end
	Signal that continues in the next byte (row)
	Signal continued from the previous byte (row)

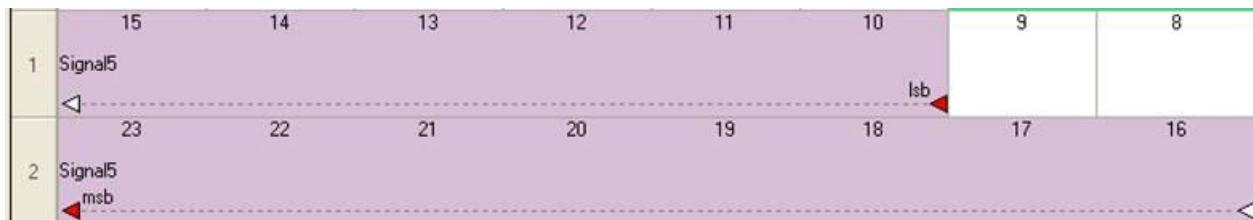
## Signal mapping in Motorola and Intel format

Depending by his endianess format (Intel = little endian; Motorola = big endian), a signal is mapped to the CAN packet in different modes:

Example of a signal with format “Motorola”, start bit = 35 and length=24



Example of a signal with format “Intel”, start bit = 10 and length=14



# GPS MDU Environment

## Abstract

The GPS editor allows the user the programming of Magneti Marelli products: MDU dashboard and CPS-GIP inertial platform containing GPS receiver.

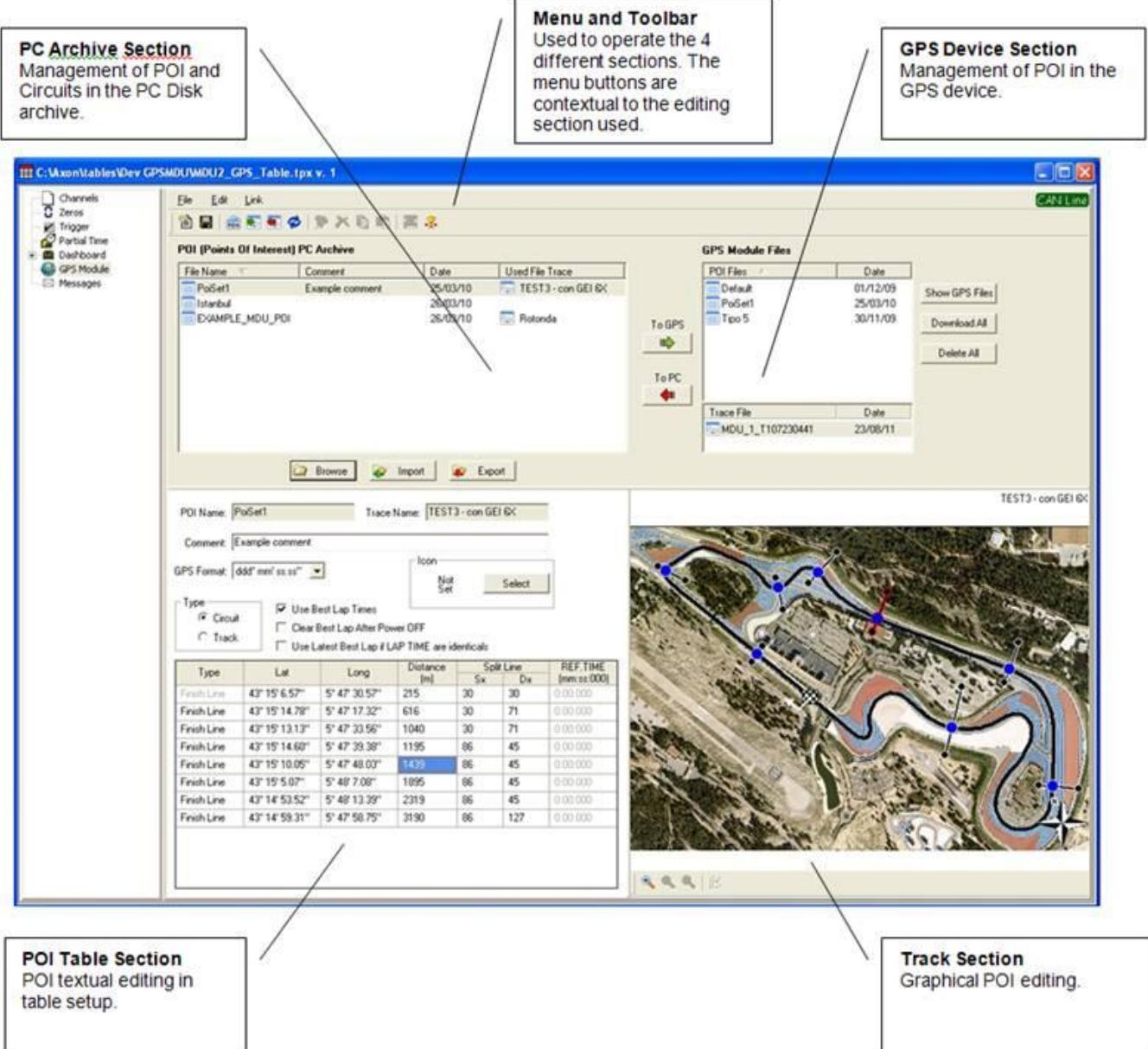
GPS Configuration Editor main functions are:

1. POI set creation (Points of Interest)
2. POI set assignment to specific track/map
3. Graphic and text editing of POI characteristics
4. Device programming
5. Device data reading

## Configuration Shell

The GPS configuration shell can assume 3 different modalities depending on the available hardware properties:

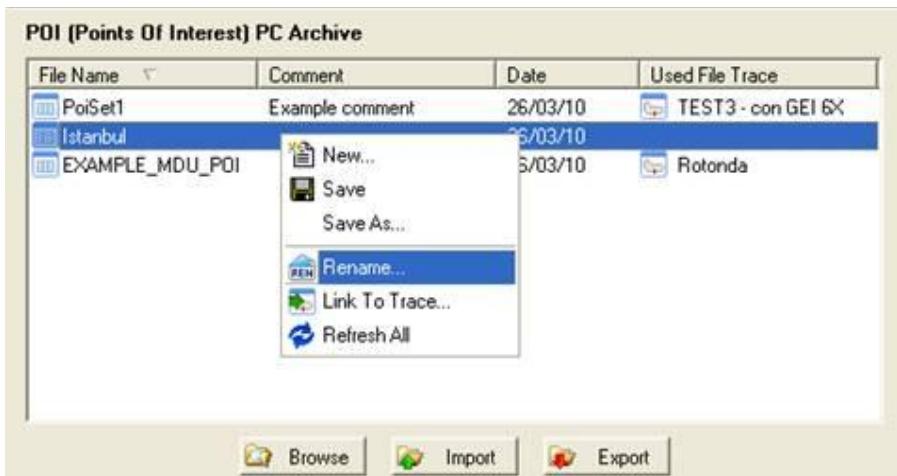
Mode	Configuration shell visualization
<b>Integrated</b> The GPS module is integrated in the MDU.	Select the “Dashboard” node in the side tree and open the “GPS Manager” Tab.
<b>Stand-alone</b> The GPS module is external to the MDU.	Directly select the “GPS Module” node in the side tree.
<b>CPS/GIP Stand-alone</b> The GPS module is in the CPS-GIP.	Directly select the “GPS Module” node in the side tree.



## PC Archive Section

This is the main section of the GPS shell, it's used to manage and visualize the archived POI resident in the PC GPS folder.

Selecting a POI file the remaining sections are updated with the properties of the selection. Moving the selection through the different POI files make the others sections automatically updated.



The listed files are the ones with extension ".POI" placed in the default directory. In the first column to the right the file "TRACE" eventually linked with the POI are listed.

Available commands from contextual menu (right click) or main toolbar/menu:

<b>New</b>	Create a new POI file
<b>Save / Save As</b>	Save the selected POI.  The "Date" field is updated with actual PC date.
<b>Rename</b>	Rename an existing POI file, and if present, the TRACE too.  NOTE: a TRACE file can be linked to different POI files at the same time, and then if it's renamed all the entries containing this file are updated.
<b>Link to Trace</b>	Assign a POI table to a TRACE file.  In the section "TRACE file assignment" is detailed the operation.
<b>Unlink From Trace</b>	Erase the POI to TRACE assignment.
<b>Refresh</b>	Refresh the GUI.

In the lower part of the window there are three buttons:

**Browse:** open the actual directory and allow the path change.

**Import:** import a POI configuration from a general path on the PC to the default GPS directory. If the imported file is linked to a TRACE, this file will be imported too.

**Export:** export the selected POI (and eventual linked TRACE) in a general directory.

## Track Identifier

All tracks are identified by the system with a particular uniquely ID value, this allow SYSMA identifying a link between a POI set to the corresponding Track. This characteristic imposes the presence in a directory of only one track with same identifier.

It may happen that exporting or importing a POI file, the corresponding track file fail to be copied in the default directory because a track with same ID is already present (e.g. if a track file is renamed). In this instance SYSMA check the ID conflict and visualize an error message:



## TRACE file assignment

A TRACE file contains a globe portion delimited by 4 GPS coordinates.

SYSMA is able to manage different kinds of TRACE files:

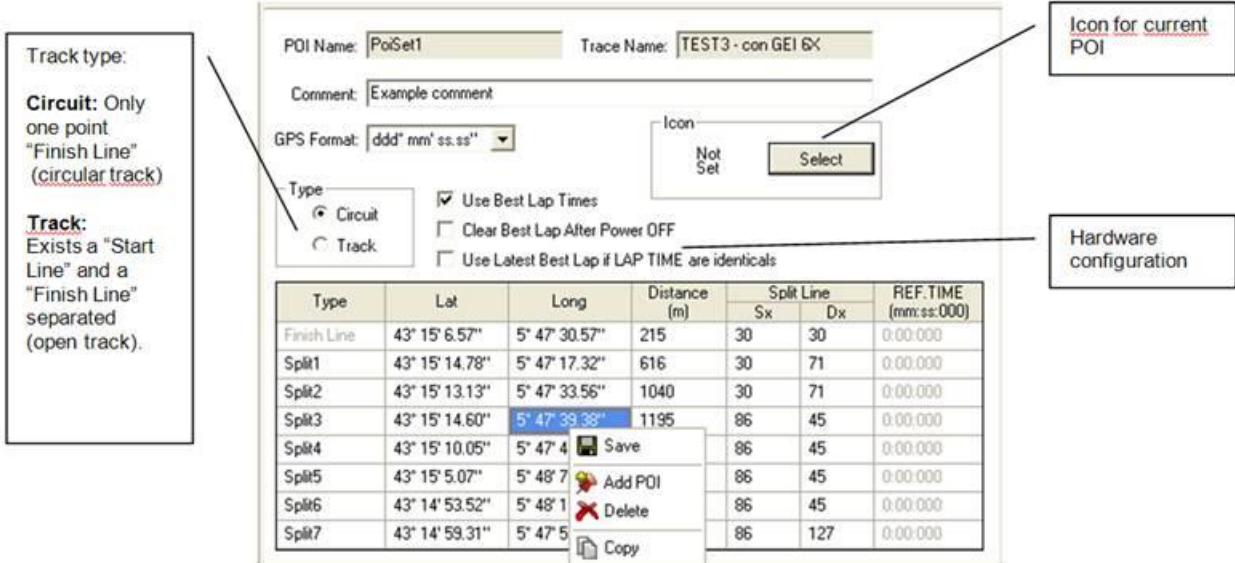
1. File .TRX (generated by the GPS device)
2. File .CGE (generated by WinTAX)
3. File .CRG (generated by WinTAX)

The CGE files, particularly, can be of two different types: **with track** or **without track** (with background picture only). It is allowed to connect a POI file with a TRACE only if they are coherent to the same globe area.

Scenario	Link mode
POI file just generated (default).	The only one POI is automatically translated by SYSMA in the area defined by the TRACE file selected.
The TRACE file is not referred to the same area.	SYSMA blocks the TRACE link.
The TRACE file is referred to the same area but POIs are not aligned with the track.	A warning message is shown and the POIs are automatically moved, perpendicularly, to join the track.

## POI Table Section

This section allows the POI files visualization and editing in the selected archive.



The editing of a cell, preserving the content, is possible by pressing F2 or SPACE or mouse double click. Copy/Paste commands are available but just inside the record POI.

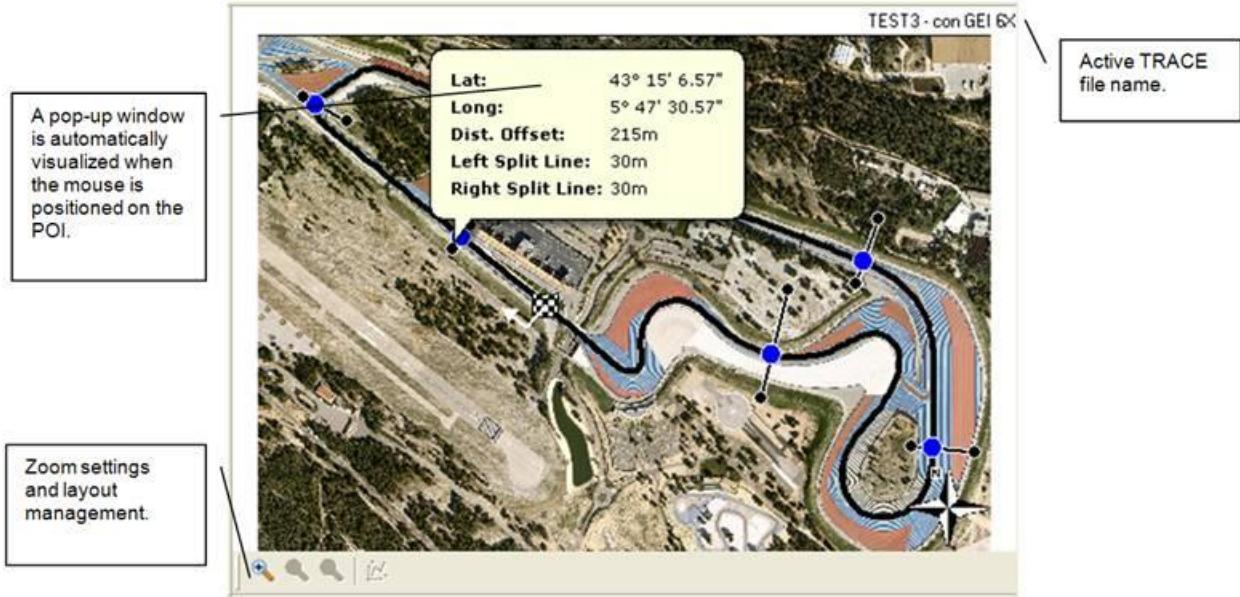
The "Distance" column can work in 2 modes:

Without linked TRACE or with TRACE but without track points (background image only).	Visualized in Read Only mode, the distance is calculated by straight line between the POIs from the starting POI.
With TRACE and track points.	Visualized the distance of the POI from the Start Line. By editing a distance value the POI is automatically translated, on the track, of the requested distance.  Distance values must always be in an increasing order. In case of wrong order the cell containing the error is highlighted in red and the table can't be sent to the device.

The "REF.TIME" column becomes Read-Only if the "Use Best Lap Times" is enabled. If not, the time values must be edited in an increasing order, otherwise the table can't be sent to the device.

## Track Section

The track section allows the user the POI graphic modification in terms of position and properties. Modifications edited in this window are updated automatically in the numeric table.

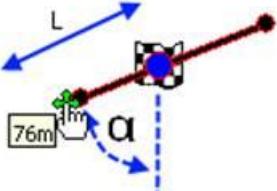


Using the toolbar buttons or by dragging the right mouse the user can Zoom in a precise window area. The window panning is possible by dragging the left mouse button.

### Connected track, POI editing:

POIs drag on the track.	<table border="1"> <thead> <tr> <th>Type</th><th>Lat</th><th>Long</th><th>Distance (m)</th><th>Split Line</th><th>Sx</th><th>Dx</th><th>REF TIME</th></tr> </thead> <tbody> <tr> <td>Finish Line</td><td>43° 15' 6.57"</td><td>5° 47' 30.57"</td><td>215</td><td>30</td><td>30</td><td></td><td>00:00:00</td></tr> <tr> <td>Sp1</td><td>43° 15' 14.78"</td><td>5° 47' 17.32"</td><td>616</td><td>30</td><td>71</td><td></td><td>00:00:00</td></tr> <tr> <td>Sp2</td><td>43° 15' 13.19"</td><td>5° 47' 33.95"</td><td>1040</td><td>30</td><td>71</td><td></td><td>00:00:00</td></tr> <tr> <td>Sp3</td><td>43° 15' 14.60"</td><td>5° 47' 38.35"</td><td>1195</td><td>86</td><td>45</td><td></td><td>00:00:00</td></tr> <tr> <td>Sp4</td><td>43° 15' 10.05"</td><td>5° 47' 4</td><td>Save</td><td>86</td><td>45</td><td></td><td>00:00:00</td></tr> <tr> <td>Sp5</td><td>43° 15' 5.07"</td><td>5° 47' 4</td><td>Add POI</td><td>86</td><td>45</td><td></td><td>00:00:00</td></tr> <tr> <td>Sp6</td><td>43° 14' 53.52"</td><td>5° 48' 1</td><td>Delete</td><td>86</td><td>45</td><td></td><td>00:00:00</td></tr> <tr> <td>Sp7</td><td>43° 14' 53.31"</td><td>5° 47' 5</td><td>Copy</td><td>86</td><td>127</td><td></td><td>00:00:00</td></tr> </tbody> </table>	Type	Lat	Long	Distance (m)	Split Line	Sx	Dx	REF TIME	Finish Line	43° 15' 6.57"	5° 47' 30.57"	215	30	30		00:00:00	Sp1	43° 15' 14.78"	5° 47' 17.32"	616	30	71		00:00:00	Sp2	43° 15' 13.19"	5° 47' 33.95"	1040	30	71		00:00:00	Sp3	43° 15' 14.60"	5° 47' 38.35"	1195	86	45		00:00:00	Sp4	43° 15' 10.05"	5° 47' 4	Save	86	45		00:00:00	Sp5	43° 15' 5.07"	5° 47' 4	Add POI	86	45		00:00:00	Sp6	43° 14' 53.52"	5° 48' 1	Delete	86	45		00:00:00	Sp7	43° 14' 53.31"	5° 47' 5	Copy	86	127		00:00:00	The POI can be moved along the track. During the operation the distance from the start line is visualized.
Type	Lat	Long	Distance (m)	Split Line	Sx	Dx	REF TIME																																																																			
Finish Line	43° 15' 6.57"	5° 47' 30.57"	215	30	30		00:00:00																																																																			
Sp1	43° 15' 14.78"	5° 47' 17.32"	616	30	71		00:00:00																																																																			
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Sp7	43° 14' 53.31"	5° 47' 5	Copy	86	127		00:00:00																																																																			
Split line length modification.		Executing the drag by the terminal point of split line it is possible the line length editing.  Editing of split line angle is not possible; it stays always perpendicular.																																																																								

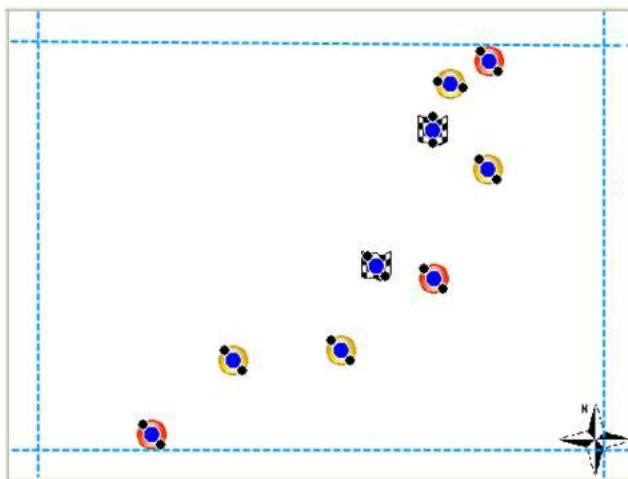
### Un-Connected track, POI editing:

POI position modification.		The POI can be moved in any position of the window.
Length and angle modification.		Dragging one of the terminal points can modify the POI split line angle. Keeping the CTRL pressed during the operation the angle is maintained constant.

### External margin setting

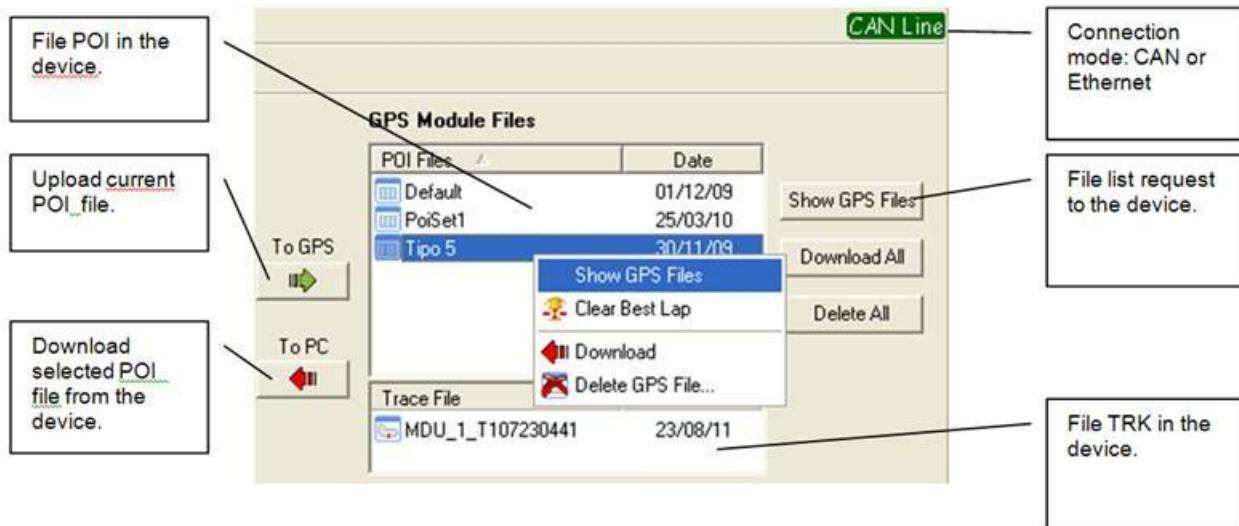
In case of use without TRACE file linked, using  button “Circuit Margins” it is possible to set up an external margin improving the visualization.

The margins are applied on all window sides giving the POI area more visibility.



## GPS Device Section

The GPS Device Section allow the user to visualize the files contained in the device, transmit POI programming tables and download POI tables or TRK files (tracks generated by the device)

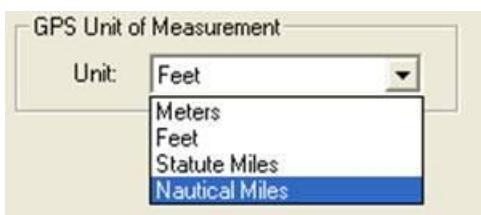


It is allowed the communication with Ethernet or CAN with MDU, CAN only with CPS/GIP in standalone configuration. Using the CAN communication the USB-CAN Peak interface has to be installed. The communication mode can be selected in the Device Description (.DEV) file:

Line = ETH o Line = CAN

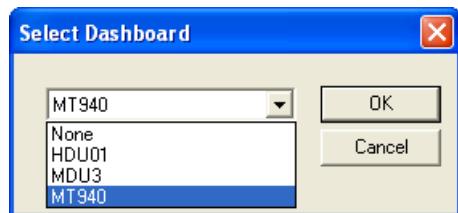
## Measure unit

In some SYSMA releases the user can select different measure units being used in the GPS shell. The unit can be selected in the general option setup.



# Dashboards

SYSMA allows to configure a dashboard integrated in each acquisition table, selecting it from a list of available types. In order to select the type of dashboard associated to a table, use command *DataLogger/Dashboard>Select Dashboard* to open *Select Dashboard* window, and select an item in the list, as shown in figure below.



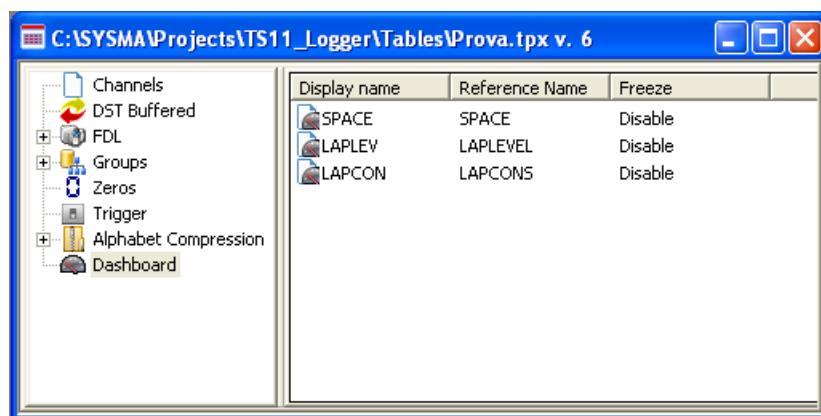
List of available dashboard types depends upon system Device Description (.DEV) file present in the Data Logger node of the SYSMA active project. The list of all dashboard types managed by SYSMA is the following:

1. DDU01
2. HDU01
3. MDU2
4. MDU3
5. MDU Standalone
6. MT940

Each dashboard type affects the way pane *Page Content* in Table edit window is shown, and how user can setup Dashboard Properties, Dashboard Alarms and Dashboard Layout (with reference to commands in *DataLogger/Dashboard/Dashboard Properties* from main menu).

## DDU01

When the dashboard configured is DDU01, the pane *Page Content* in table edit window simply shows a list of channels configured for the dashboards.



The image shows a screenshot of a Windows application window titled "C:\SYSMA\Projects\TS11\_Logger\Tables\Prova.tpx v. 6". The window has a tab bar at the top with three tabs: "Page Content", "Page Layout", and "Page Properties". The "Page Content" tab is selected. On the left side, there is a tree view with nodes: "Channels", "DST Buffered", "FDL", "Groups", "Zeros", "Trigger", "Alphabet Compression", and "Dashboard". The "Dashboard" node is expanded. On the right side, there is a table with the following data:

Display name	Reference Name	Freeze
 SPACE	SPACE	Disable
 LAPLEV	LAPLEVEL	Disable
 LAPCON	LAPCONS	Disable

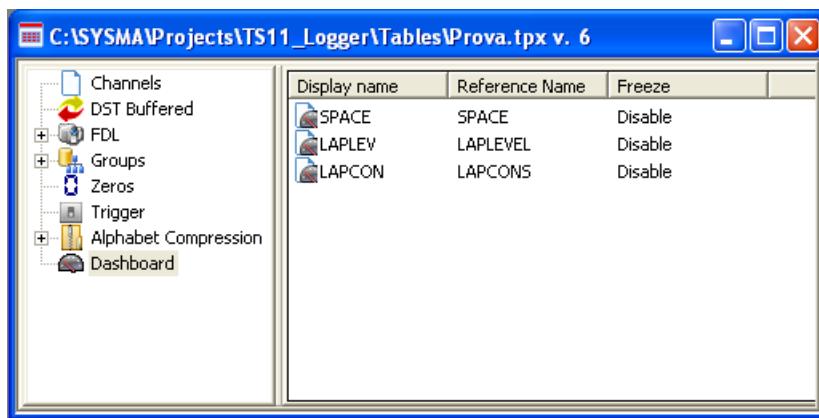
Right click with mouse in the left pane to open a pop-up menu with commands for manage or setup dashboard channels.

Double left click or send enter on channels to open the window *Channel Properties* at the page *Dashboard*.

Standard commands for Dashboard Properties and Dashboard Alarm setup are available in main menu (*DataLogger/Dashboard*).

## **HDU01**

When the dashboard configured is HDU01, the pane *Page Content* in table edit window simply shows a list of channels configured for the dashboards.



Display name	Reference Name	Freeze
SPACE	SPACE	Disable
LAPLEVEL	LAPLEVEL	Disable
LAPCONS	LAPCONS	Disable

Right click with mouse in the left pane to open a pop-up menu with commands for manage or setup dashboard channels.

Double left click or send enter on channels to open the window *Channel Properties* at the page *Dashboard*.

Standard commands for Dashboard Properties and Dashboard Alarm setup are available in main menu (*DataLogger/Dashboard*).

## **MDU2**

When the dashboard configured is MDU2, *Dashboard* item in the tree of left pane shows the list of all channels configured for the table or read from system Device Description (.DEV) file.

An icon on the left of each channel item shows channel type:

-  TEMP1 - This icon represents an internal channel
-  LAPDISTANCE - This icon represents a standard channel available in the acquisition table

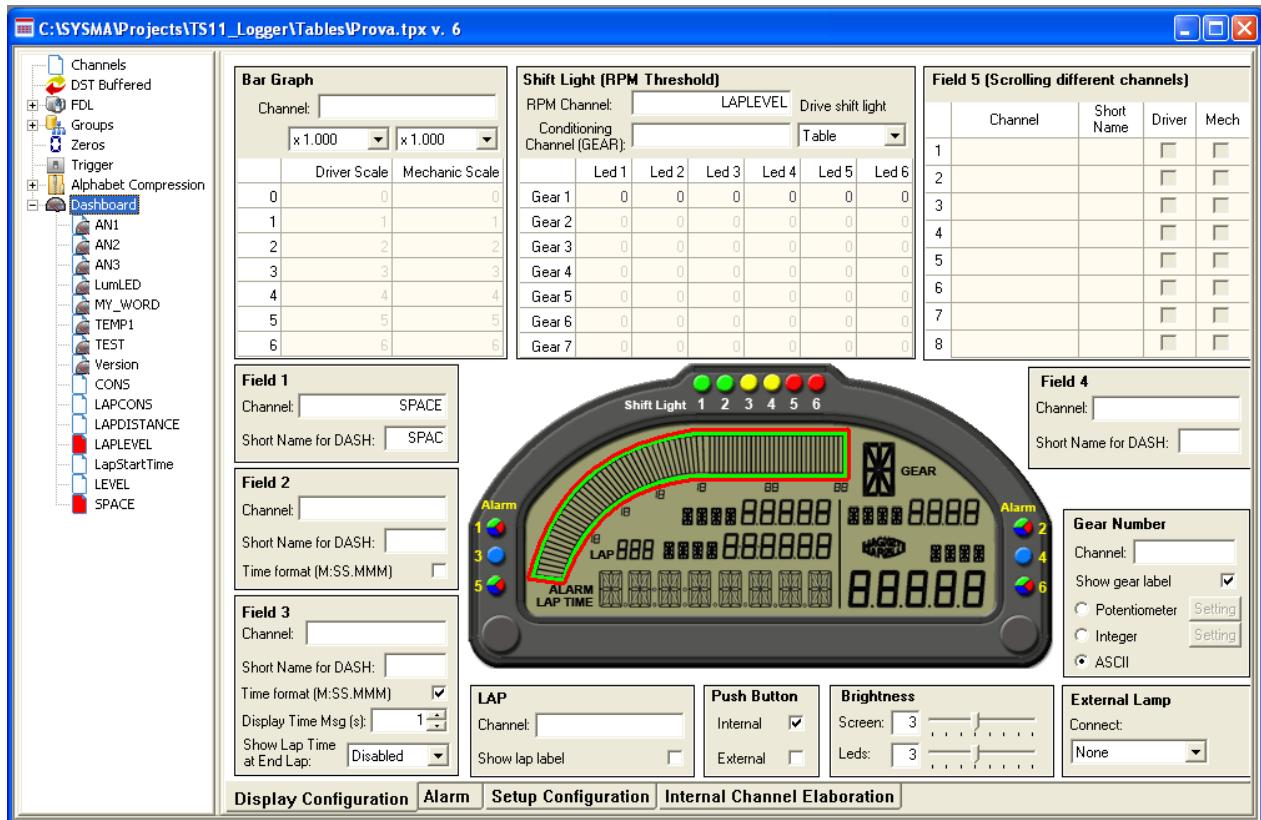
If an icon has a red background it means that the corresponding channel is used for the dashboard configuration (for example its value is displayed in an area of the dashboard or used to verify an alarm).

 SPACE - Channel used in the dashboard configuration

In the right pane, user can select several pages for managing enhanced dashboard setup.

All dashboard and dashboard alarm configurations can be performed using the right pane in the table edit window.

## Display Configuration



The page *Display Config* shows an image of the dashboard and all settings that can be displayed on the dashboard itself.

When a single section is focused, correspondent item on dashboard image is highlighted.

To configure a channel use Drag & Drop from the left tree or double click (the channel will be inserted in the focused field of the dashboard).

### Bargraph section

This section allows to configure the channel to display in *Bar Graph* item (usually RPM), and 2 scales (Driver and Mechanics) associated to *Bar Graph* item.

Each scale can be normalized with a multiplicative factor.

### **Field 1 section**

This section allows to configure the channel to display in *Field 1* item (usually Speed), and a short name displayed on dashboard for the channel.

### **Field 2 section**

This section allows to configure the channel to display in *Field 2* item (usually Best Lap or Diff Time), and a short name displayed on dashboard for the channel.

A further flag allows to enable visualization format M:SS.MMM.

### **Field 3 section**

This section allows to configure the channel to display in *Field 3* item (usually Lap Time, a message or an alarm), and a short name displayed on dashboard for the channel.

Labels 'LAP TIME' or 'ALARM' are visible if channel configured is a message or an alarm.

A further flag allows to enable visualization format M:SS.MMM.

Field 3 is used to display Lap Time of end lap value also. This information is temporarily shown over configured channel.

### **Field 4 section**

This section allows to configure the channel to display in *Field 4*, and a short name displayed on dashboard for the channel.

### **Field 5 section**

Using table of this section is possible to insert a set of channels in dashboard table that will be displayed in *Field 5* scrolling the field.

For each channel, is possible to define a short name displayed on dashboard and enable channel visualization in Driver or Mechanic configuration.

### **Lap section**

This section allows to configure the channel to display in *Lap* item (usually Lap Time).

A further flag allows to show or hide string "LAP", useful if no channel is configured.

### **Gear Number section**

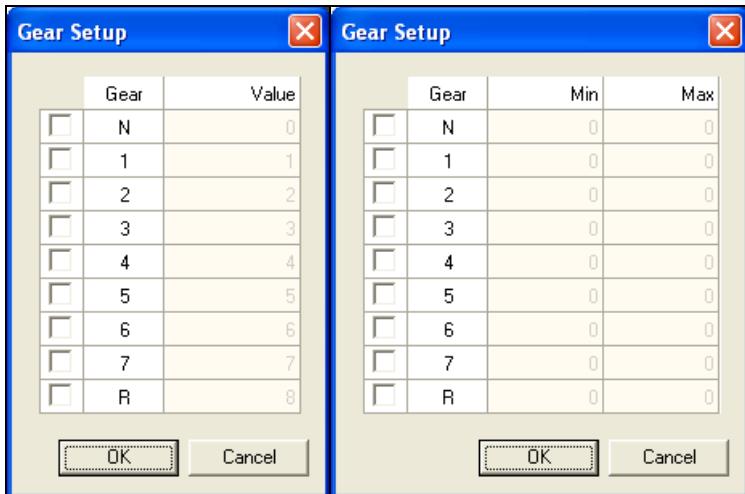
This section allows to configure the channel to display in *Gear* item (usually Gear Number in ASCII format).

A further flag allows to show or hide string "GEAR", useful if no channel is configured.

Two 'setting' buttons will open a window to configure values that user wants to associate to what is displayed.

User can choose between integer values, with defaults, or range of values for a potentiometer.

Each value in the list can be enabled or not using a flag on the left.



### Shift Light section

This section allows to configure the channel for engine RPM and conditional associated channel (usually Gear).

Threshold values for LEDs lightning can be set using the table. If no conditional associated channel is specified, only first row in the table can be set.

*Drive shift light* set up the way LEDs will light.

Table thresholds will be used only when *Table* is selected in this combo.

As a channel for engine RPM is specified, *Drive shift light* is set to *Table*.

### Push Button section

This section allows to enable or disable internal and external buttons.

Functions associated to sx/dx buttons are fixed, as follows:

P1, quick press	alarm temporarily darkening
P1, protract press	enable brightness change; following quick press allows to set up Led/LCD brightness. After 10 seconds of inactivity, behavior returns to default.
P2, quick press	page scroll within each category
P2, protract press	toggle between Driver and Mechanic page (including rpm bar)

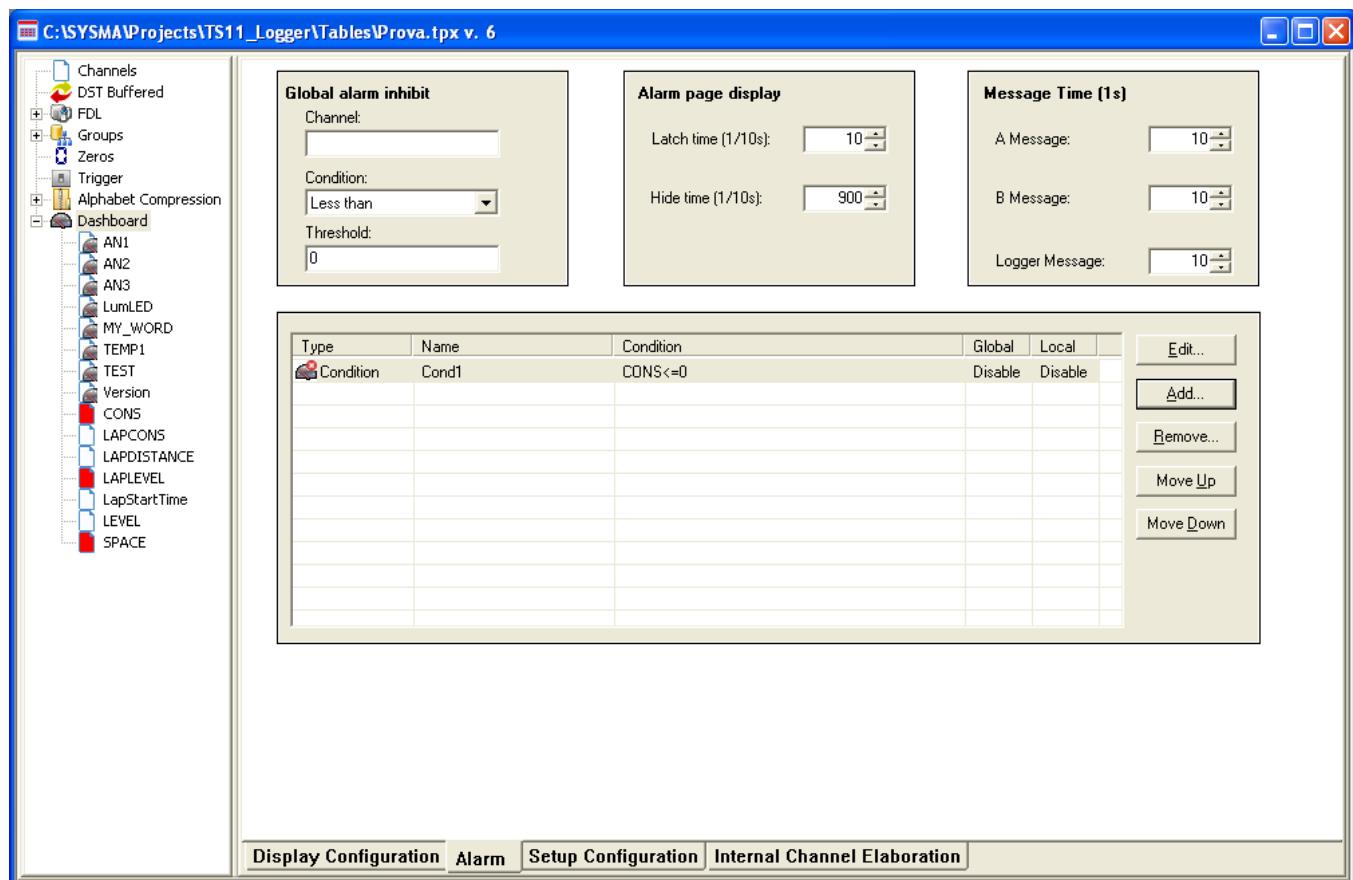
## Brightness section

This section allows to configure LEDs and dashboard display brightness, using graphic bars in a range from 0 to 7.

## External Lamp section

This section allows to choose an event for starting connection to data logger, and if connection will be driven or not by a CAN packet. The list of possible choices depends upon system Device Description (.DEV) file settings.

# Alarm



This page allows to configure dashboard alarms.

### Global alarm inhibit section

This section allows to configure a channel and a threshold value, over which all alarms will be inhibited.

### Alarm page display section

This section allows to configure Latch Time and Hide Time as usual.

### Message Time section

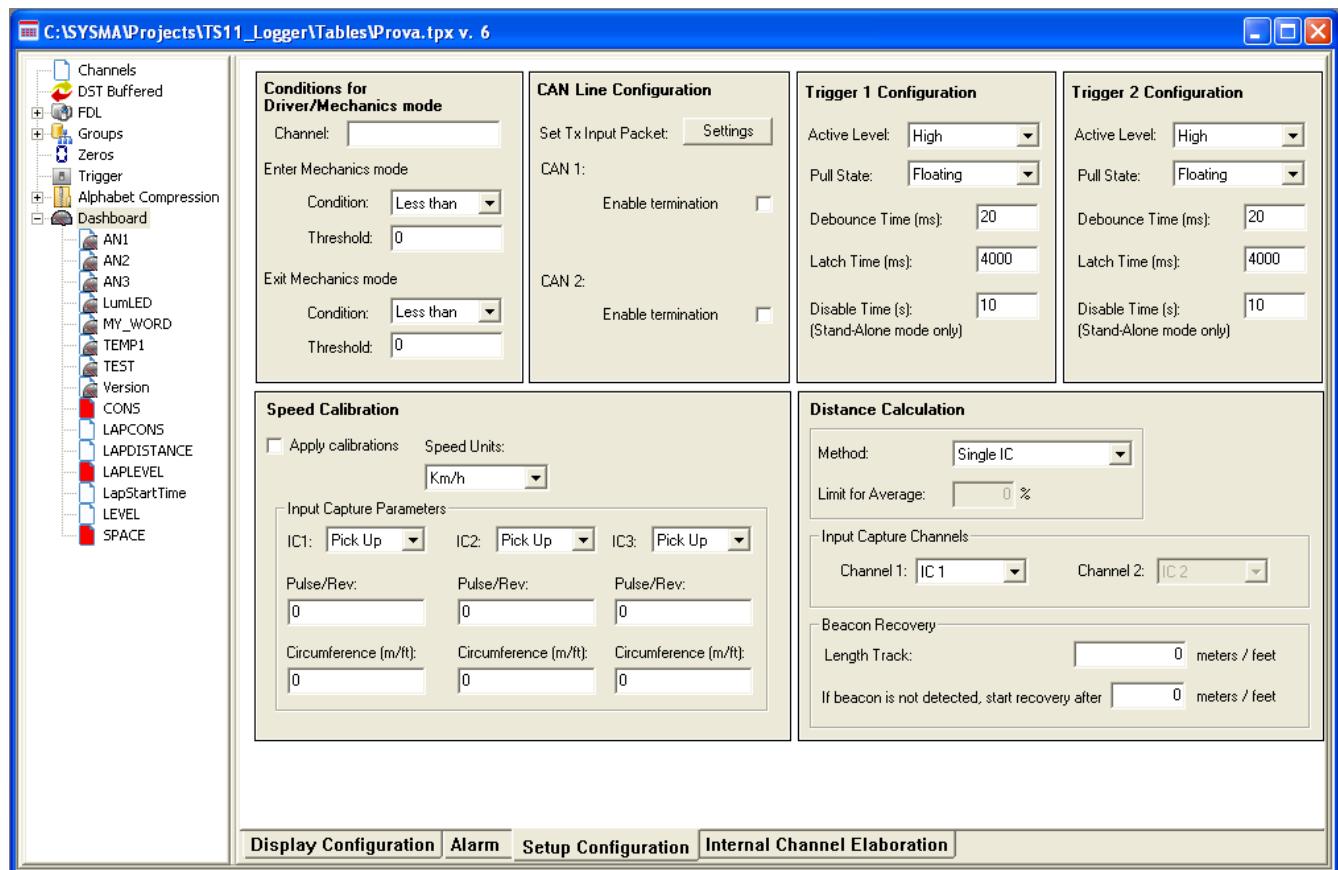
This section allows to setup delays (number of seconds a message is shown on dashboard display) for messages to show

A Message	Delay for message A
B Message	Delay for message B
Logger Message	Delay for logger message

## Section alarms

This section allows configuration of alarms as usual (see *Dashboard Alarms*).

# Setup Configuration



*Setup Configuration* page configures all settings that don't belong to visual display area of the dashboard.

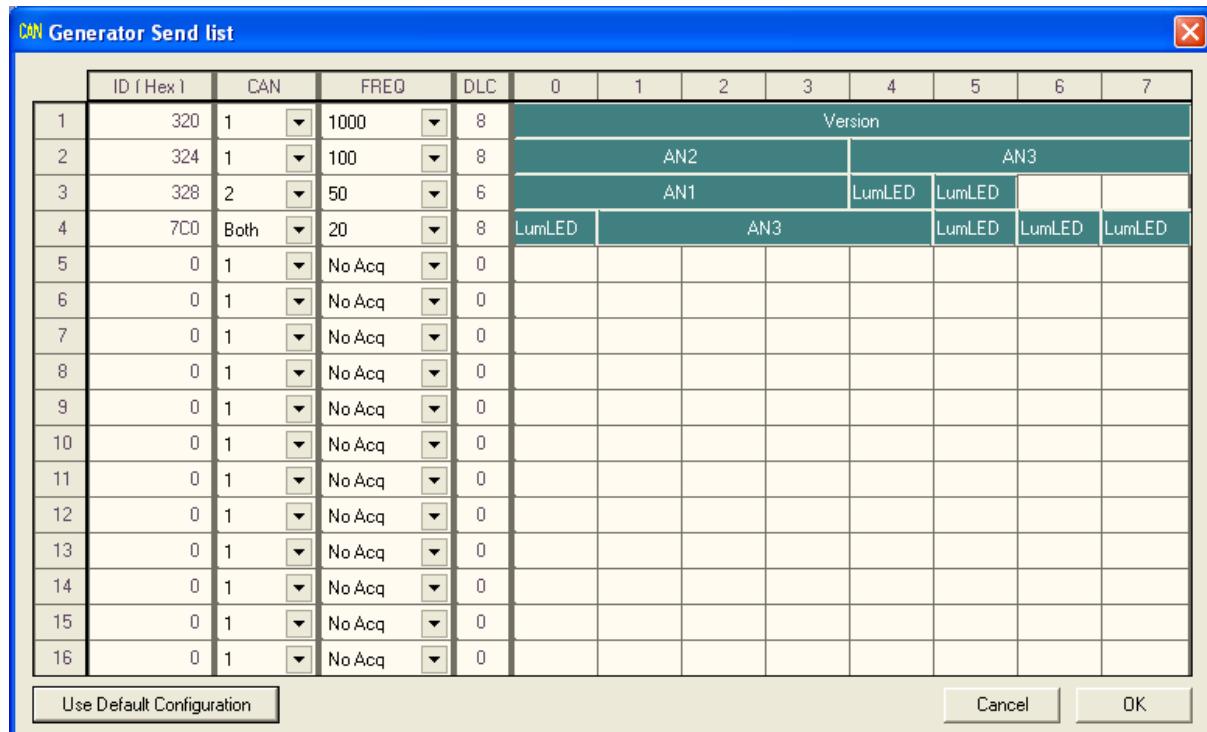
### Shares for Driver/Mechanics Mode section

This section allows to configure a channel and two associated threshold values, for enter and exit from Mechanics mode.

Two types of condition are available: *Greater than* and *Less than*.

## CAN Line Configuration section

*Settings* button opens a popup window, where CAN packet to transmit can be configured.



<i>ID ( Hex )</i>	Packed ID in hexadecimal format
<i>CAN</i>	CAN to which send packet (CAN1, CAN2 or both)
<i>FREQ</i>	Packet frequency
<i>DLC</i>	this field is automatically calculated by tool
<i>Data (bytes from 0 to 7)</i>	Insert here channels using Drag & Drop or double click on channel

*Use Default Configuration* button will set a configuration written in system Device Description (.DEV) file.

## Trigger 1 and 2 Configuration section

This section allows to configure triggers:

<i>Active Level</i>	choose if signal is High, Low, Positive Pulse or Negative Pulse
<i>Pull State</i>	choose pull state Pull-up, Pull-down or Floating
<i>Debounce Time</i>	minimum amount of time for finish line reception
<i>Latch Time</i>	amount of time for keeping signal after finish line reception (disabled if Active Level is Pulse)
<i>Disable Time</i>	used only in standalone mode

## **Speed Calibration section**

This section allows to set:

1. the sensor type for speed take over (*pick-up/hall effect*),
2. the speed unit measure,
3. parameters for each gateway.

## **Distance Calculation section**

This section allows to set

1. the Method used for Distance Calculation

<i>Single IC</i>	Use a single IC channel, selected in combo Ch1
<i>Avg or Max Value</i>	calculate an average on two IC channels selected, when value specified in <i>Limit for average %</i> is overtaken, lower signal is discarded.
<i>Avg or Min Value</i>	calculate an average on two IC channels selected, when value specified in <i>Limit for average %</i> is overtaken, higher signal is discarded.

- Beacon recovery

<i>Length Track</i>	track length
<i>start recovery</i>	passed this value software finish line will be set

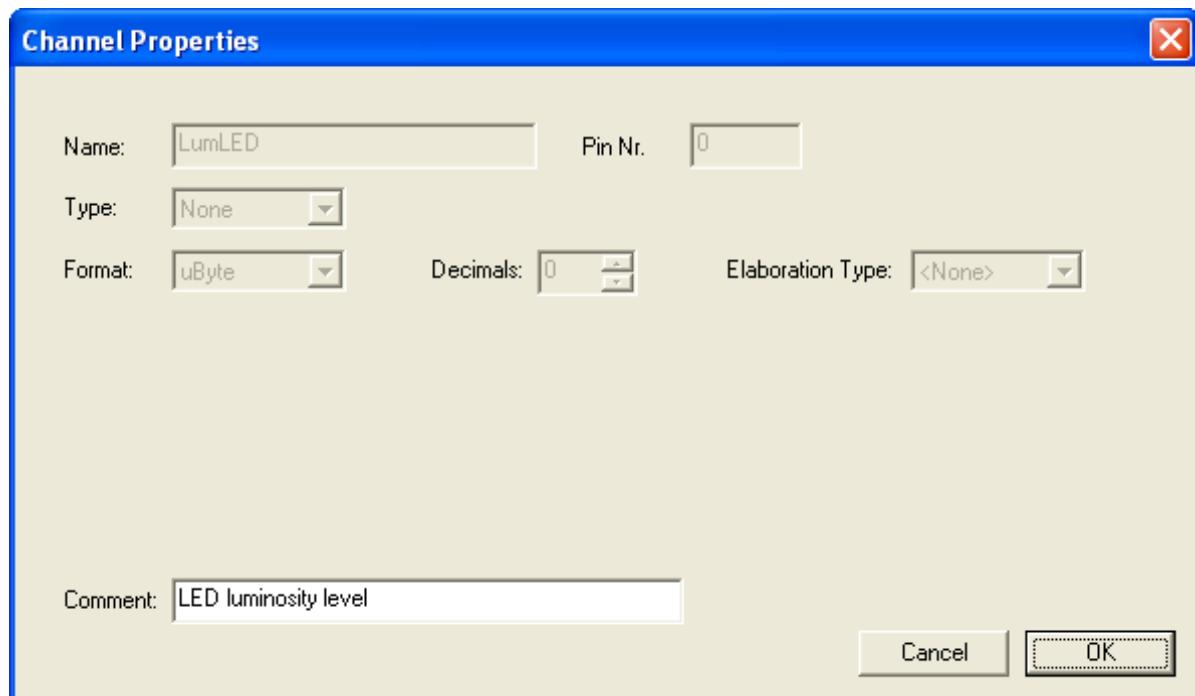
These setting strategies will create some internal channels: Average Speed, Lap Distance, Odometer and Diagnostics.

# Internal Channel Elaboration

C:\SYSMA\Projects\TS11_Logger\Tables\Prova.tpx v. 6							
Channel Name	Pin Nr.	Input Type	Format	Decimals Number	Elab. Type	Comment	
AN1	3	An. Input	Float	3	Line	Analogic input 1	
AN2	8	An. Input	Float	3	Line	Analogic input 2	
AN3	2	An. Input	Float	3	Line	Analogic input 3	
LumLED	0	None	uByte	0	<None>	LED luminosity level	
MY_WORD	55	None	uWord	1	PolyLine	Con nome duplicato	
TEMP1	18	NTC	Float	2	PolyLine	Temperature	
TEST	19	PT 1000	Float	1	PolyLine	Canale di prova	
Version	0	None	String	0	<None>	MDU software version	

This page lists the array of channels configured as dashboard input in system Device Description (.DEV) file.

With double click in single item in the list is possible to configure input channel fields, using window *Channel Properties*.



# MDU3

When the dashboard configured is MDU3, *Dashboard* item in the tree of left pane shows the list of all channels configured for the table or read from system Device Description (.DEV) file. An icon on the left of each channel item shows channel type:

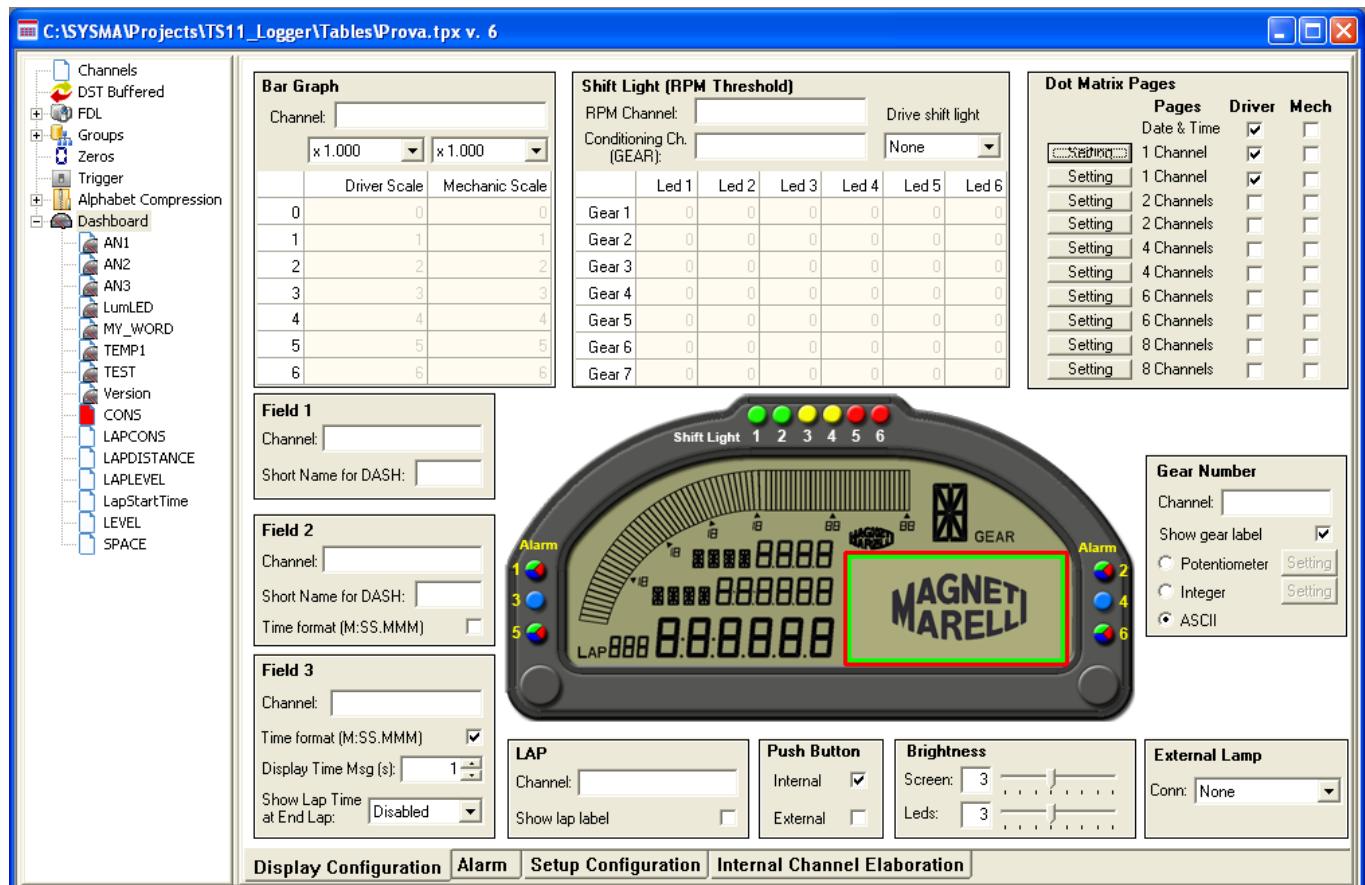
- ... TEMP1 - This icon represents an internal channel
- ... LAPDISTANCE - This icon represents a standard channel available in the acquisition table

If an icon has a red background it means that the corresponding channel is used for the dashboard configuration (for example its value is displayed in an area of the dashboard or used to verify an alarm).

- ... SPACE - Channel used in the dashboard configuration

In the right pane, user can select several pages for managing enhanced dashboard setup. All dashboard and dashboard alarm configurations can be performed using the right pane in the table edit window.

## Display Configuration



The page *Display Config* shows an image of the dashboard and all settings that can be displayed on the dashboard itself.

When a single section is focused, correspondent item on dashboard image is highlighted.

To configure a channel use Drag & Drop from the left tree or double click (the channel will be inserted in the focused field of the dashboard).

### **Bagraph section**

This section allows to configure the channel to display in *Bar Graph* item (usually RPM), and 2 scales (Driver and Mechanics) associated to *Bar Graph* item.

Each scale can be normalized with a multiplicative factor.

### **Field 1 section**

This section allows to configure the channel to display in *Field 1* item (usually Speed), and a short name displayed on dashboard for the channel.

### **Field 2 section**

This section allows to configure the channel to display in *Field 2* item (usually Best Lap or Diff Time), and a short name displayed on dashboard for the channel.

A further flag allows to enable visualization format M:SS.MMM.

### **Field 3 section**

This section allows to configure the channel to display in *Field 3* item (usually Lap Time, so a short name is not available).

This field is arranged to display a Best Lap or Diff Time value, so a further flag allows to enable visualization format M:SS.MMM.

*Field 3* is used to display Lap Time of end lap value also. This information is temporarily shown over configured channel.

### **Lap section**

This section allows to configure the channel to display in *Lap* item (usually Lap Time).

A further flag allows to show or hide string "LAP", useful if no channel is configured.

### **Gear Number section**

This section allows to configure the channel to display in *Gear* item (usually Gear Number in ASCII format).

A further flag allows to show or hide string "GEAR", useful if no channel is configured.

Two 'setting' buttons will open a window to configure values that user wants to associate to what is displayed.

User can choose between integer values, with defaults, or range of values for a potentiometer.

Each value in the list can be enabled or not using a flag on the left.



### Shift Light section

This section allows to configure the channel for engine RPM and conditional associated channel (usually Gear).

Threshold values for LEDs lightning can be set using the table. If no conditional associated channel is specified, only first row in the table can be set.

*Drive shift light* set up the way LEDs will light.

Table thresholds will be used only when *Table* is selected in this combo.

As a channel for engine RPM is specified, *Drive shift light* is set to *Table*.

### Push Button section

This section allows to enable or disable internal and external buttons.

Functions associated to sx/dx buttons are fixed, as follows:

P1, quick press	alarm temporarily darkening
P1, protract press	enable brightness change; following quick press allows to set up Led/LCD brightness. After 10 seconds of inactivity, behavior returns to default.
P2, quick press	page scroll within each category
P2, protract press	toggle between Driver and Mechanic page (including rpm bar)

## Brightness section

This section allows to configure LEDs and dashboard display brightness, using graphic bars in a range from 0 to 7.

## External Lamp section

This section allows to choose an event for starting connection to data logger, and if connection will be driven or not by a CAN packet.

The list of possible choices depends upon system Device Description (.DEV) file settings.

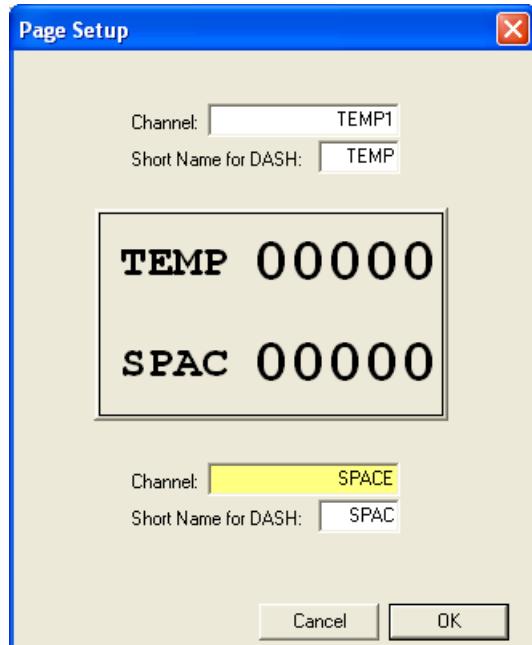
## Dot Matrix Pages section

This section contains several predefined hard coded pages. Pages can be used as Driver, Mechanics or None, depending on a tool flag.

Switch from Driver to Mechanic pages depends upon settings configured in *Setup Configuration* page or protract press on a button. When switching, rpm bar graph scale will change also.

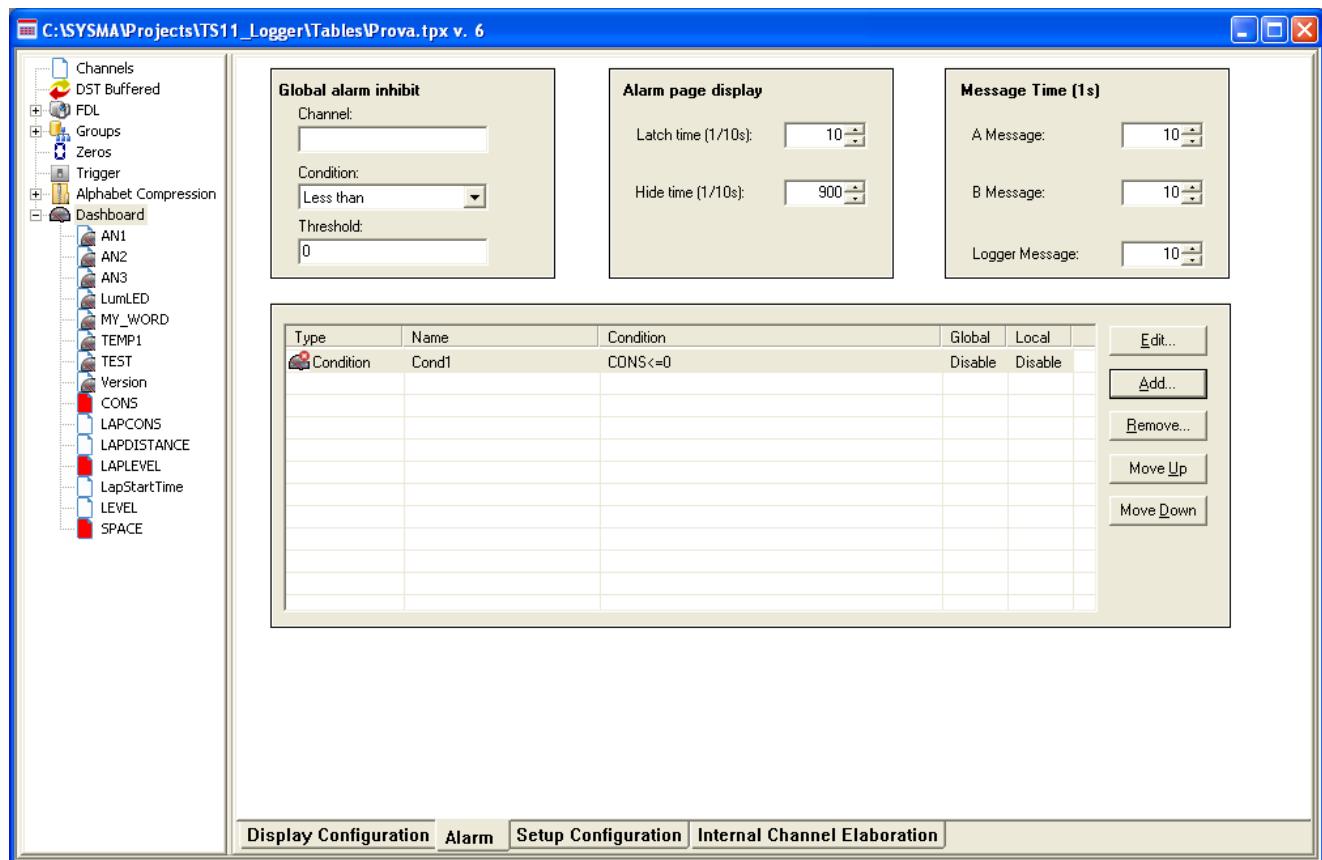
Quick press on a button allows scrolling within page types, without changing rpm bar scale.

Click on each *Setting* button will open a pop up window for configuring each single Dot Matrix page. Following figure shows an example for 8 channels.



Channel and a short name can be configured as usual.

# Alarm



This page allows to configure dashboard alarms.

## Global alarm inhibit section

This section allows to configure a channel and a threshold value, over which all alarms will be inhibited.

## Alarm page display section

This section allows to configure Latch Time and Hide Time as usual.

## Message Time section

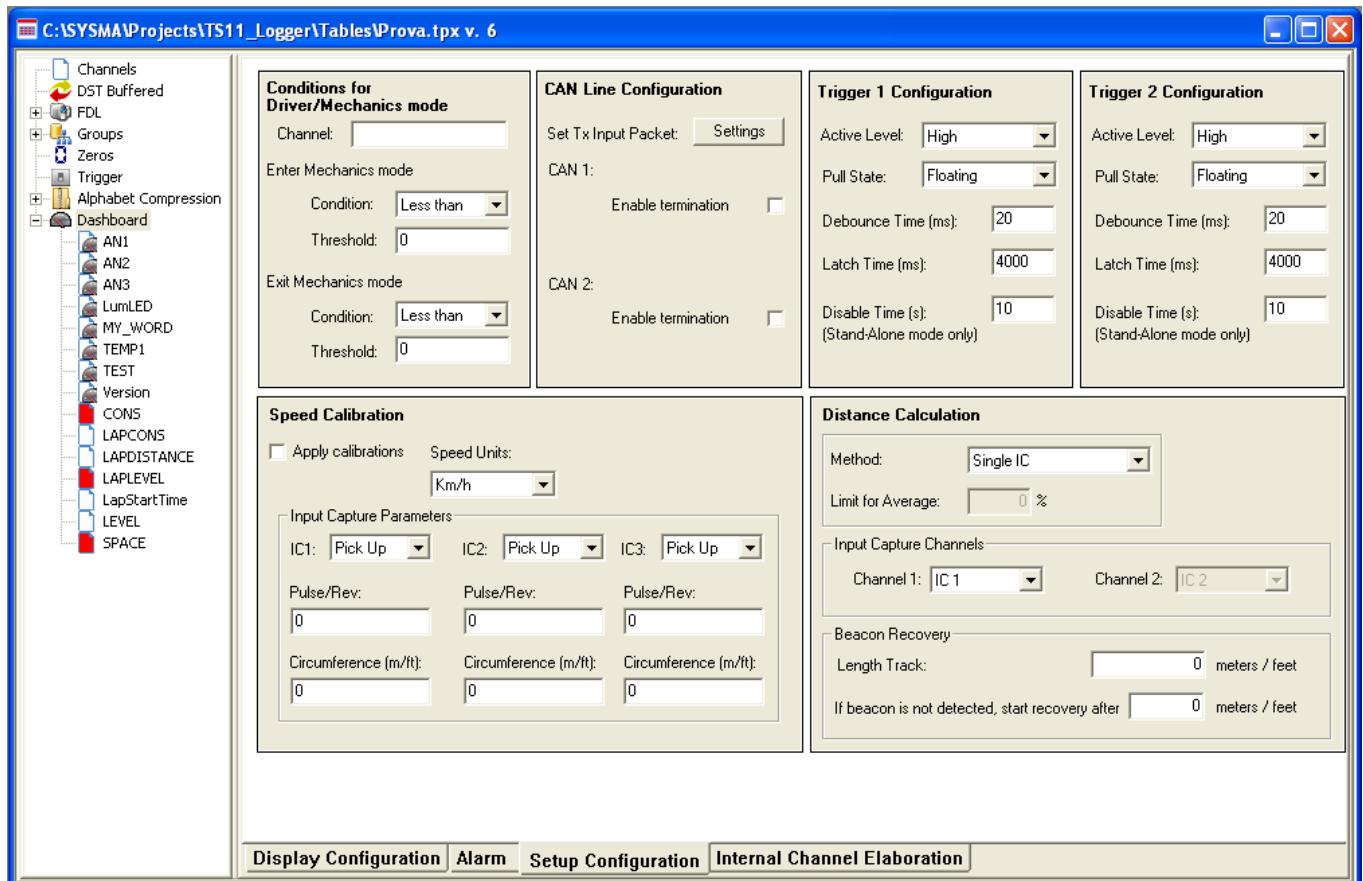
This section allows to setup delays (number of seconds a message is shown on dashboard display) for messages to show

A Message	Delay for message A
B Message	Delay for message B
Logger Message	Delay for logger message

## Section alarms

This section allows configuration of alarms as usual (see *Dashboard Alarms*).

# Setup Configuration



*Setup Configuration* page configures all settings that don't belong to visual display area of the dashboard.

### Shares for Driver/Mechanics Mode section

This section allows to configure a channel and two associated threshold values, for enter and exit from Mechanics mode.

Two types of condition are available: *Greater than* and *Less than*.

### CAN Line Configuration section

*Settings* button opens a popup window, where CAN packet to transmit can be configured.

CAN Generator Send list

ID (Hex)	CAN	FREQ	DLC	0	1	2	3	4	5	6	7
1	320	1	1000	8	Version						
2	324	1	100	8	AN2			AN3			
3	328	2	50	6	AN1			LumLED	LumLED		
4	7C0	Both	20	8	LumLED	AN3			LumLED	LumLED	LumLED
5	0	1	No Acq	0							
6	0	1	No Acq	0							
7	0	1	No Acq	0							
8	0	1	No Acq	0							
9	0	1	No Acq	0							
10	0	1	No Acq	0							
11	0	1	No Acq	0							
12	0	1	No Acq	0							
13	0	1	No Acq	0							
14	0	1	No Acq	0							
15	0	1	No Acq	0							
16	0	1	No Acq	0							

<i>ID (Hex)</i>	Packed ID in hexadecimal format
<i>CAN</i>	CAN to which send packet (CAN1, CAN2 or both)
<i>FREQ</i>	Packet frequency
<i>DLC</i>	this field is automatically calculated by tool
<i>Data (bytes from 0 to 7)</i>	Insert here channels using Drag & Drop or double click on channel

Use *Default Configuration* button will set a configuration written in system Device Description (.DEV) file.

### Trigger 1 and 2 Configuration section

This section allows to configure triggers:

<i>Active Level</i>	choose if signal is High, Low, Positive Pulse or Negative Pulse
<i>Pull State</i>	choose pull state Pull-up, Pull-down or Floating
<i>Debounce Time</i>	minimum amount of time for finish line reception
<i>Latch Time</i>	amount of time for keeping signal after finish line reception (disabled if Active Level is Pulse)
<i>Disable Time</i>	used only in standalone mode

## Speed Calibration section

This section allows to set:

1. the sensor type for speed take over (*pick-up/hall effect*),
2. the speed unit measure,
3. parameters for each gateway

## Distance Calculation section

Method used for Distance Calculation

<i>Single IC</i>	Use a single IC channel, selected in combo Ch1
<i>Avg or Max Value</i>	calculate an average on two IC channels selected, when value specified in <i>Limit for average %</i> is overtaken, lower signal is discarded.
<i>Avg or Min Value</i>	calculate an average on two IC channels selected, when value specified in <i>Limit for average %</i> is overtaken, higher signal is discarded.

Beacon recovery

<i>Length Track</i>	track length
<i>start recovery</i>	passed this value software finish line will be set

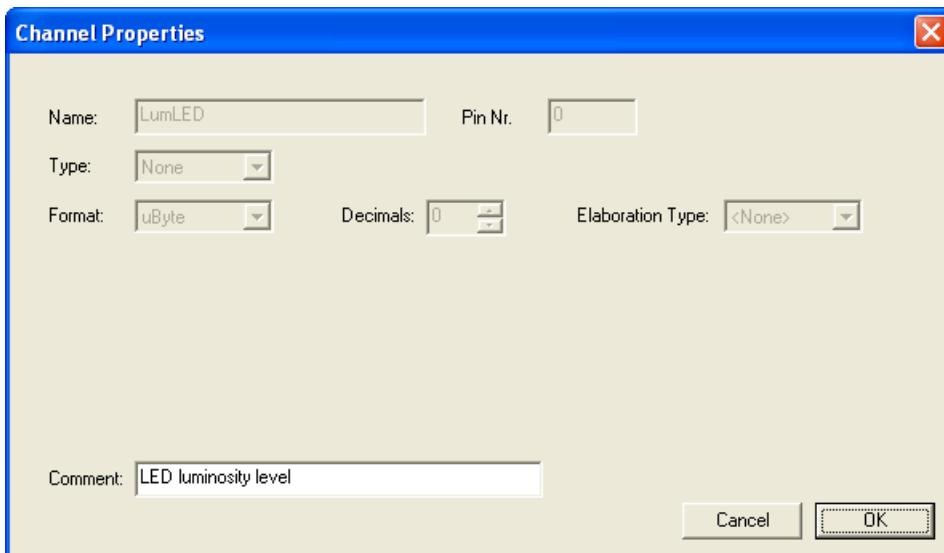
These setting strategies will create some internal channels: Average Speed, Lap Distance, Odometer and Diagnostics.

# Internal Channel Elaboration

C:\SYSMA\Projects\TS11_Logger\Tables\Prova.tpx v. 6						
	Channel Name	Pin Nr	Input Type	Format	Decimals Number	Elab. Type
Channels	AN1	3	An. Input	Float	3	Line
DST Buffered	AN2	8	An. Input	Float	3	Line
FDL	AN3	2	An. Input	Float	3	Line
Groups	LumLED	0	None	uByte	0	<None>
Zeros	MY_WORD	55	None	uWord	1	PolyLine
Trigger	TEMP1	18	NTC	Float	2	PolyLine
Alphabet Compression	TEST	19	PT 1000	Float	1	PolyLine
Dashboard	Version	0	None	String	0	<None>
AN1						Analogic input 1
AN2						Analogic input 2
AN3						Analogic input 3
LumLED						LED luminosity level
MY_WORD						Con nome duplicato
TEMP1						Temperature
TEST						Canale di prova
Version						MDU software version
CONS						
LAPCONS						
LAPDISTANCE						
LAPLEVEL						
LapStartTime						
LEVEL						
SPACE						

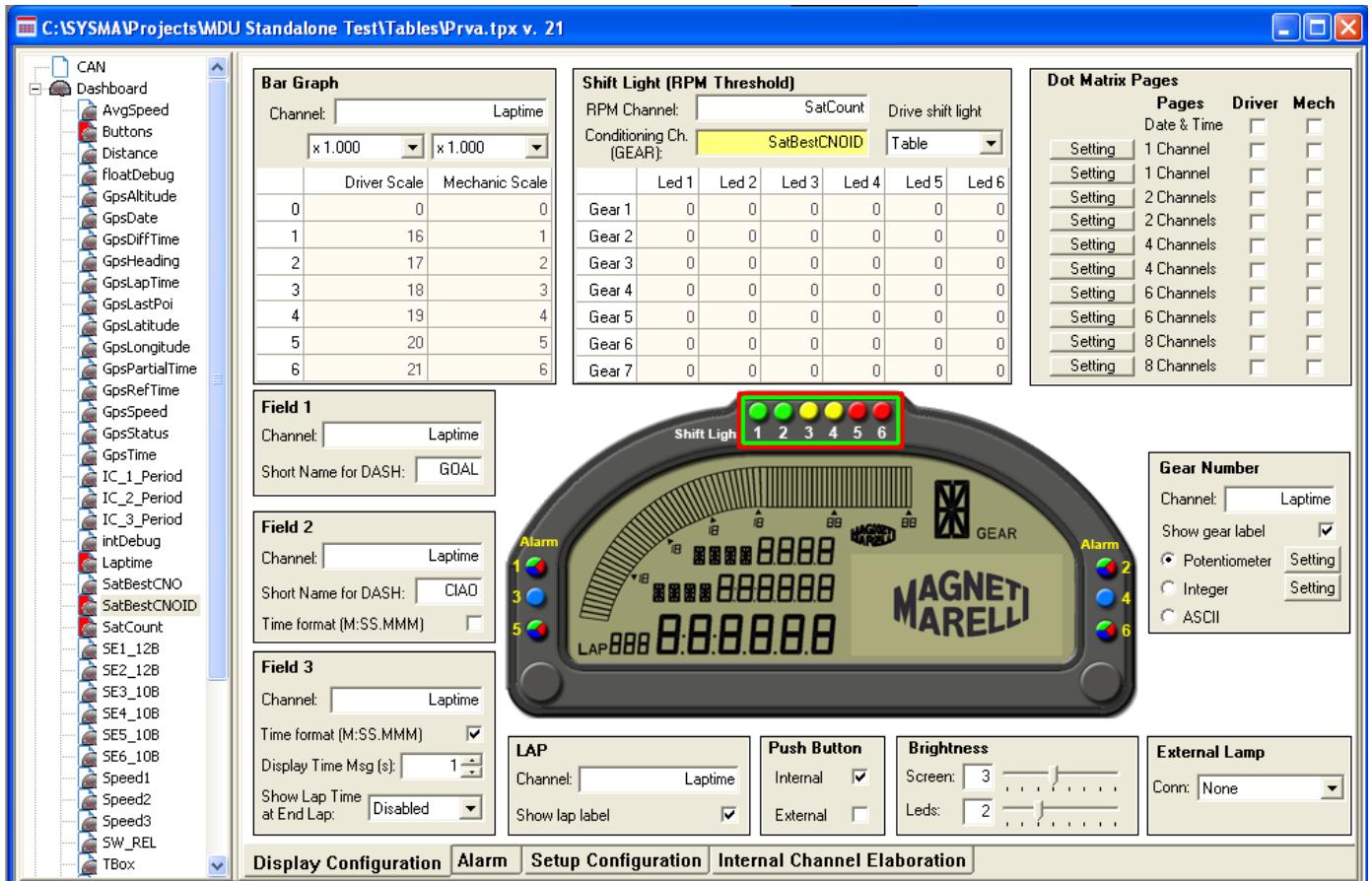
This page lists the array of channels configured as dashboard input in system Device Description (.DEV) file.

With double click in single item in the list is possible to configure input channel fields, using window *Channel Properties*.



# MDU Standalone

A new mode can be used to edit a table with a MDU2 or MDU3 dashboard in a configuration without logger control unit.



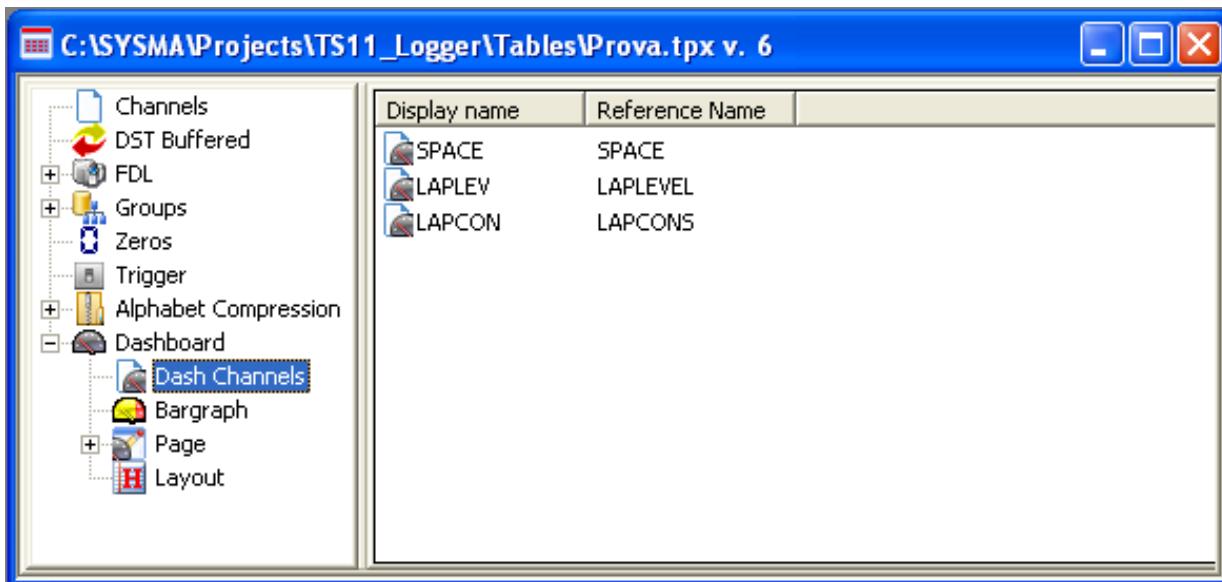
As you can see in the example image, the side tree contains only the CAN channels (which can be inserted normally from CLX), if any, and internal channels of the dashboard. The configuration operations are the same as those described in previous sections of the manual for MDU dashboards.

## MT940

When MT940 dashboard is selected, *Dashboard* item in the tree on the left pane is split into more items, as shown in figure.

The content of right pane changes when selecting a different item in the tree.

## Dash Channels

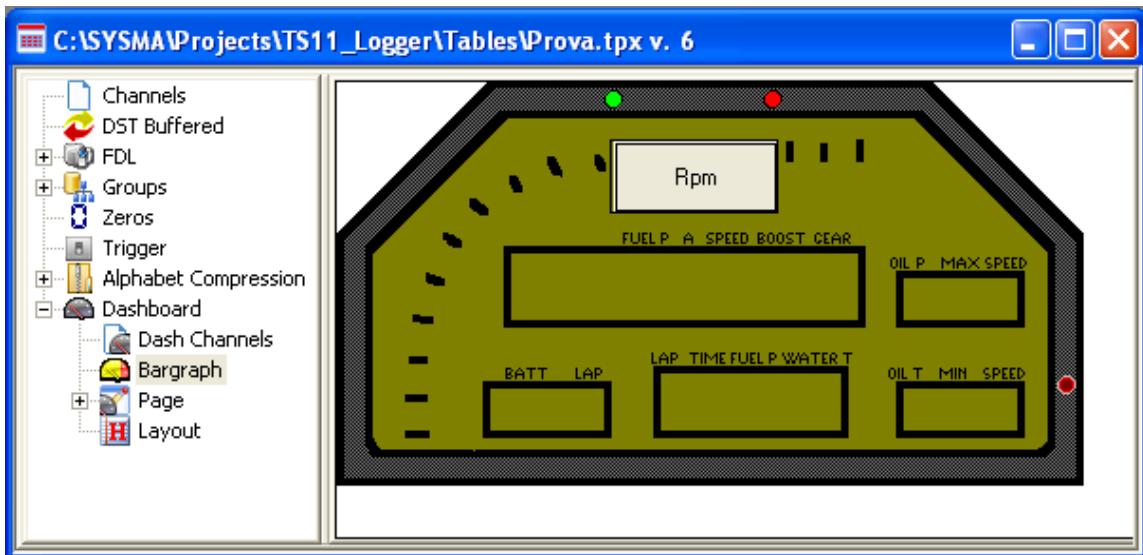


*Dash Channels* shows the list of channels configured in the dashboard.

Right click with mouse in the left pane to open a pop-up menu with commands for manage or setup channels.

Double left click or send enter on channels to open the window Channel Properties at the page Dashboard.

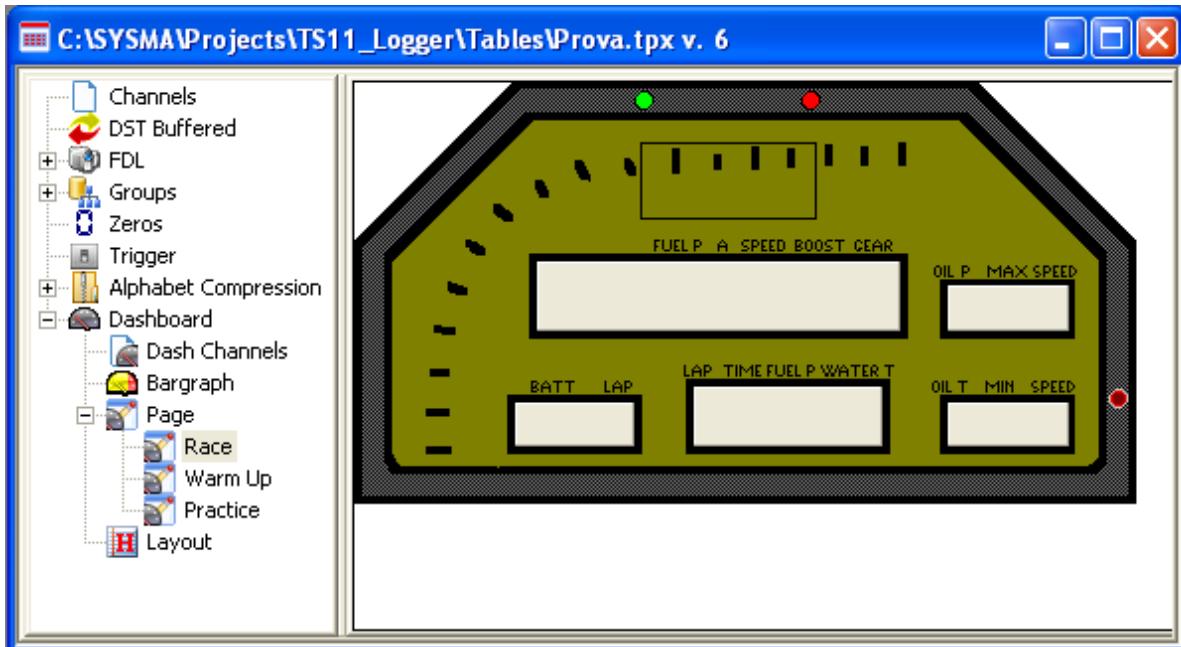
## Bargraph



*Bargraph* shows an image of the dashboard.

Channel for Rpm box item can be selected from a pop up list, using command Properties in the popup menu that opens with mouse right click on the image.

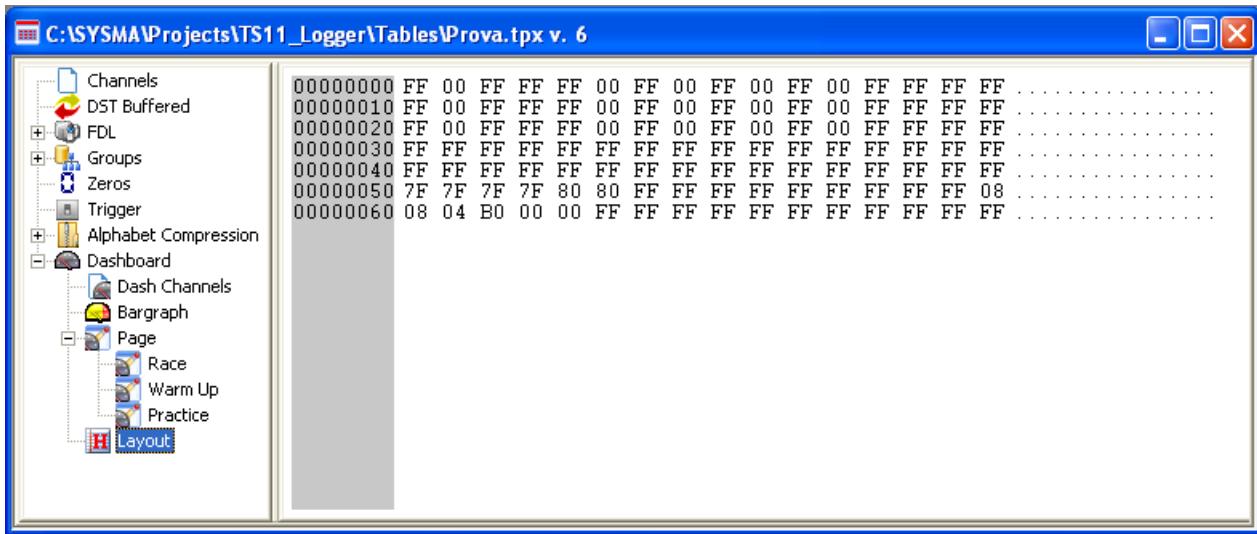
Page



Three different configurations of the dashboard are available: *Race*, *Warm Up*, *Practice*.

In each configuration, in order to associate a channel to a single item box, select it and use command Properties from popup menu, which can be opened with mouse right click. Channel can be chosen from a pop up list.

# Layout



*Layout* shows dashboard configuration buffer in Hexadecimal format.

Standard commands for Dashboard Properties and Dashboard Alarm setup are available in main menu (*DataLogger/Dashboard/*).

# Dashboard Graphic Editor

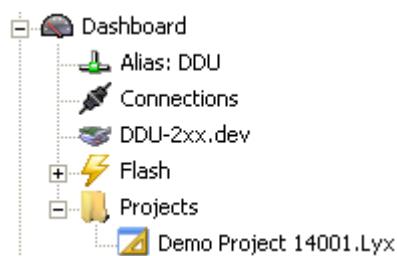
## Editor Description

### Introduction

The Dashboard Editor work environment is a graphic environment, which is used to create a setup project and send it to the dashboard.

### The Dashboard node

In order to enable the dashboard editor environment a Dashboard node must be present in the current project:

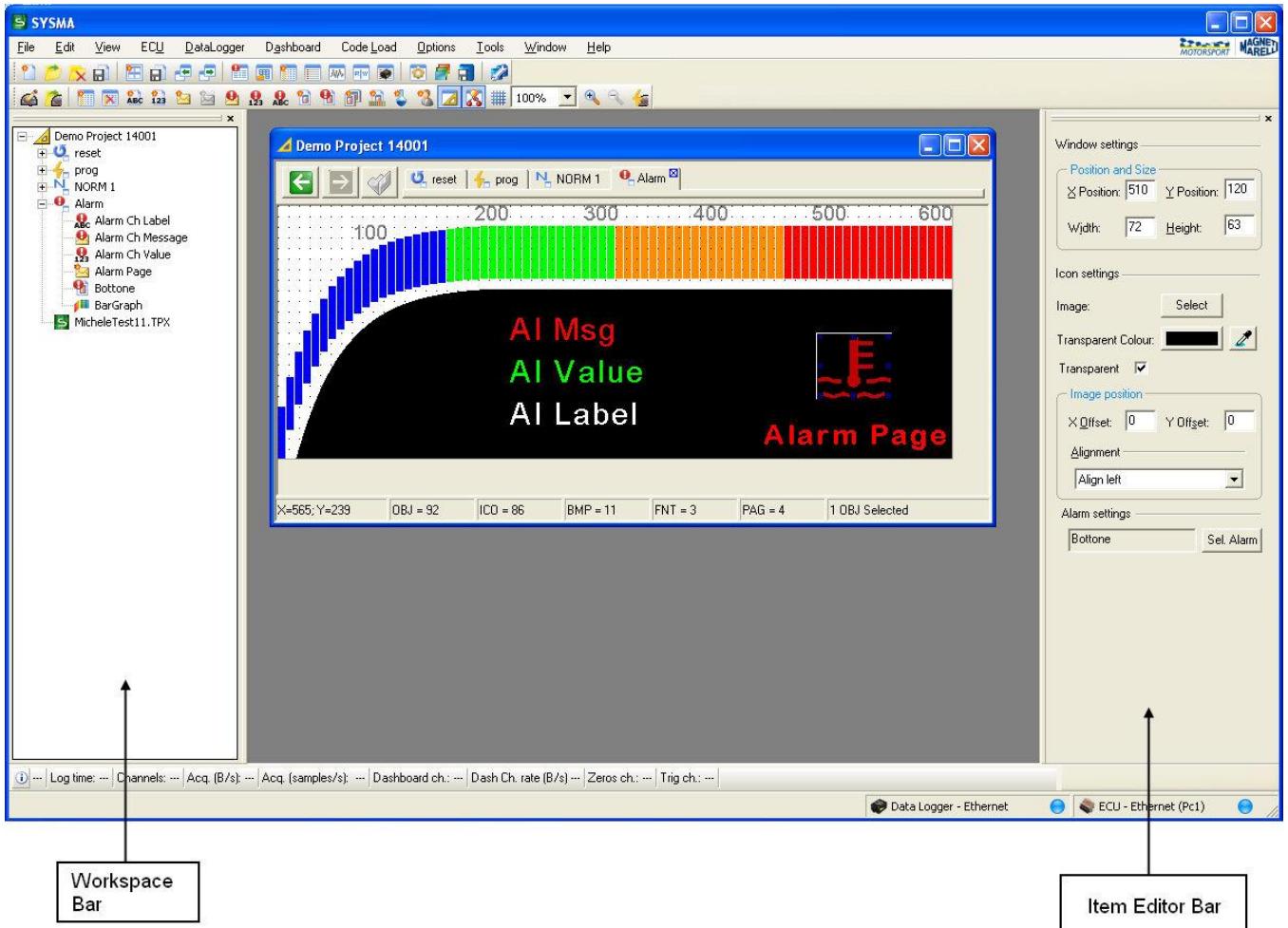


The procedures needed to create or to import an existing dashboard project will be described in the Project Editing chapter.

## Workspace Overview

The dashboard working area consists of 2 main bars: the **Workspace Bar** and the **Item Editor Bar**, in addition to other bars containing the most frequently used tools.

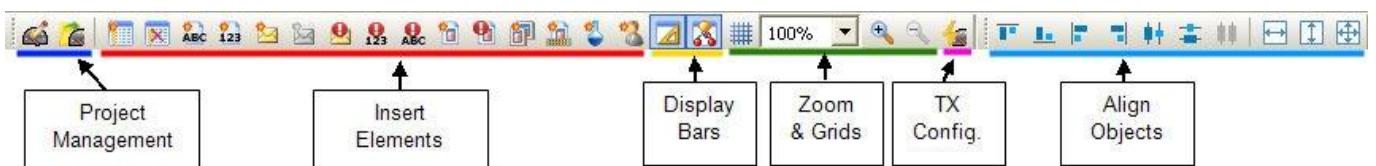
When a dashboard project is opened, SYSMA's Project Workspace Bar is automatically closed and the 2 side bars are shown to guarantee the maximum space available to work in this environment. When the dashboard project is closed, the Workspace Bar and the Item Editor Bar are automatically hidden.



The *Workspace bar* enables the user to view the complete structure of open projects and to perform operations on their individual elements.

The Item Editor Bar enables the user to perform operations on the currently selected elements of the project. Its content is variable and depends on which objects are selected. The different types of content will be described later.

The toolbars have different functions:



## Directory structure

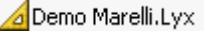
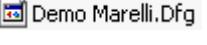
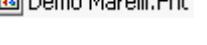
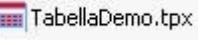
In its default configuration, the SYSMA installation directory (insofar as the part relating to Dashboard Editor is concerned) is organized as follows:



Backgrounds	Archive of all images available for insertion as a page background (only the .bmp format is supported). Image files can be inserted in this folder directly by the user or imported using the corresponding SYSMA functions.
Icons	Archive of all images available for insertion into image objects (only the .bmp format is supported). Image files can be inserted in this folder directly by the user or imported using the corresponding SYSMA functions.
Instruments	Archive of .Din (Dashboard Instrument File) files  , which contain all of the information needed to create an instrument. They can be copied from one computer to the next in order to extend the library. It is also possible to create custom instruments using SYSMA.
UserObjects	Archive of .Uob (User Object File) files  , which contain a series of objects configured by the user with all of their relative parameters. These files enable the user to automatically insert a group of pre-configured objects. They can be copied from one computer to the next in order to extend the library. They are created by SYSMA.

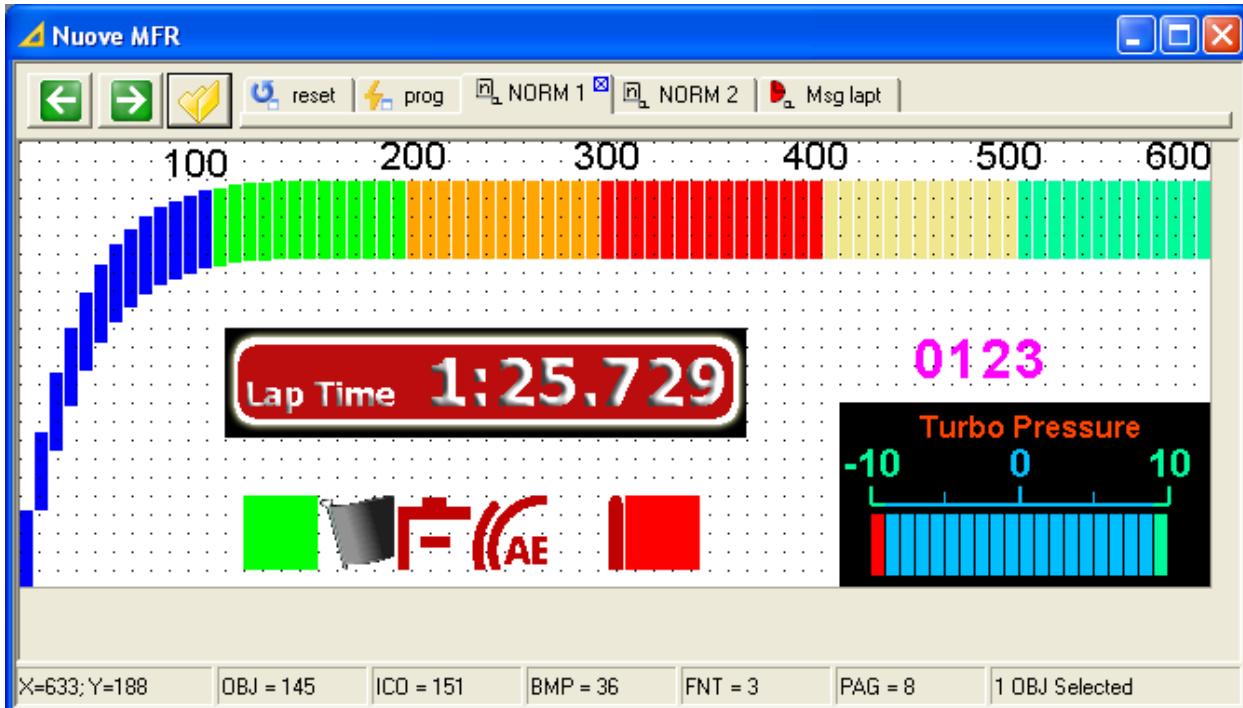
## Files types used in dashboard projects

This is a list of the files used by SYSMA to configure a dashboard layout. The user MUST NOT MODIFY these files manually, for risk of losing all data. A dashboard project consists of the following files:

File extension	Example	Description
.Lyx		The main project file. It contains all of the page settings. It must be present in the SYSMA project in order to work on the layout.
.Dfg		This file contains the images needed for the setup. It is updated dynamically by SYSMA during editing operations.
.Fnt		This file contains the fonts needed for the setup. It is updated dynamically by SYSMA during editing operations.
Device Description file (.DEV)		This is the descriptive file of the connected hardware system. It is loaded or replaced automatically by SYSMA.
.TPX, .TFX, .TJX...		(OPTIONAL) This is the acquisition table. It is loaded or replaced automatically by SYSMA. The different extensions are managed depending on the version of SYSMA that is installed.

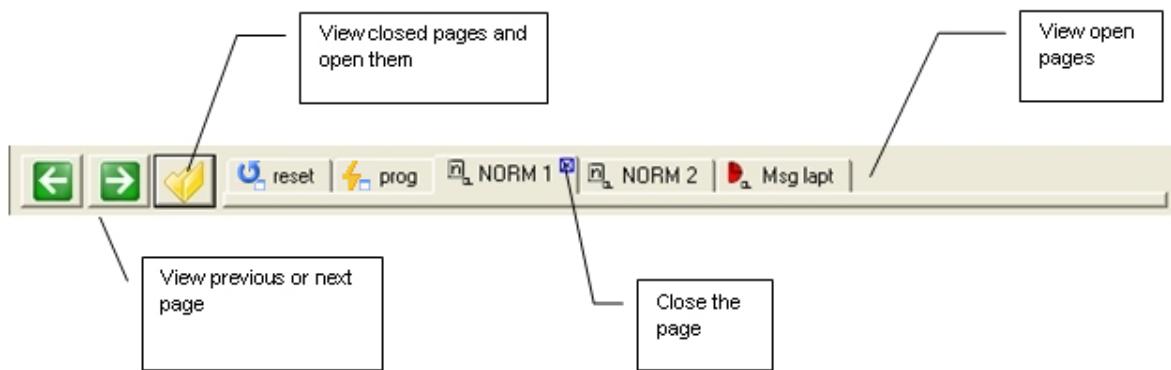
# Working Area

## Project Window



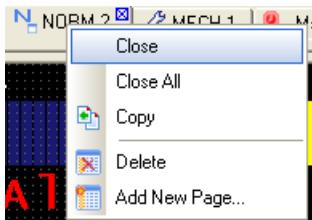
The Project Window is used to graphically edit and configure all of the elements that will appear in the dashboard for each specific page.

The top section contains a local toolbar for interaction with the pages:



Click the small “x” on the tab of each page to close the page. Clicking on the file button can then retrieve the closed page.

Note that closed pages are not deleted from the project and are still transmitted to the dashboard as part of the configuration.

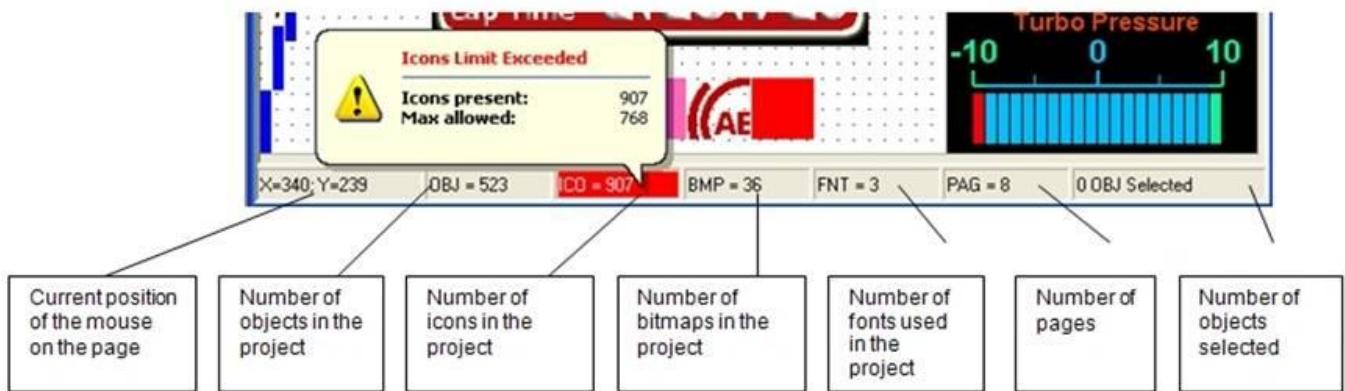


Right-click on the tab of a page to bring up the context menu which enables you to

1. Insert a new page (if available in the Device Description file (.DEV))
2. Permanently delete the page
3. Close all pages (*prog* and *reset* cannot be closed)
4. Copy the page to the clipboard

The central area of the window represents the page preview, which will be described in more detail later.

The bottom part of the window enables you to keep track of all of the current project parameters and displays warnings in the case of abnormal situations:



The background of the cells will turn **red** if one of the project limits is exceeded. Position the mouse over the cell to bring up a detailed description of the error.

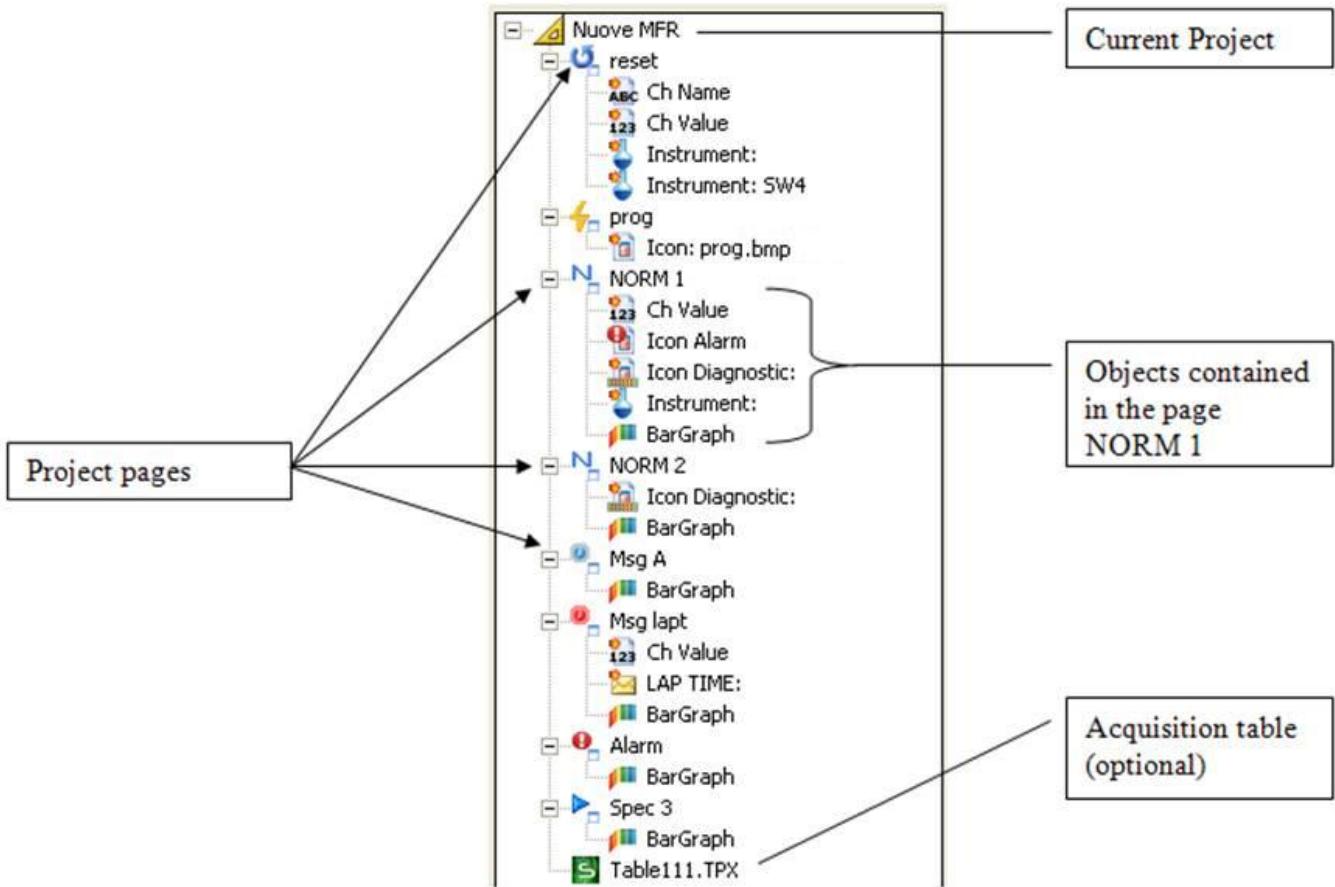
If one of the cells is in error status, the project WILL NOT be sent to the dashboard.

## Workspace bar

The Workspace bar provides an overview of all open projects and enables the user to interact with individual project elements.

It can be hidden or displayed using the command *Show / Hide Project Bar* present in the toolbar "Dashboard".

When a dashboard project is opened, the *SYSMA project workspace* bar is automatically closed and this toolbar is shown, conversely if there are no open dashboard projects, it is automatically hidden.



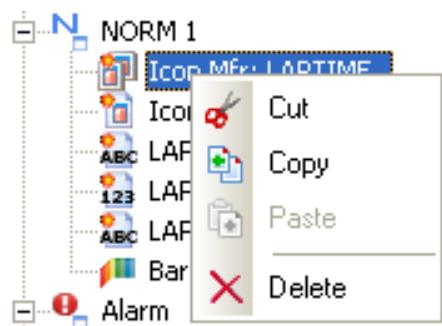
The order of the pages in the project is fixed and depends on the Device Description file (.DEV).

The objects contained within a page are sorted alphabetically except for the Bargraph element (if present), which is always last.

The objects of a page, if linked to a channel, display the channel name after the colon.

Selecting an object in the toolbar results in the automatic selection of the corresponding object in the project window.

To bring up the list of operations which can be performed on each element, right-click over the element and a context menu will appear



## Operations permitted on PAGE elements

Copy / Paste	Entire pages can be copied and pasted to and from any project or within the same project. If the pasted page is already present and if the current settings allow, you can select a new page as the destination for the operation
Drag & Drop	Can only be performed from one project to another
Delete	Depends on the selected element

## Operations permitted on OBJECT elements

Copy / Paste	All types of copy and paste operations are permitted on objects, even within the same page
Drag & Drop	Can only be performed from one page to another page (regardless of the project)
Delete	Always available

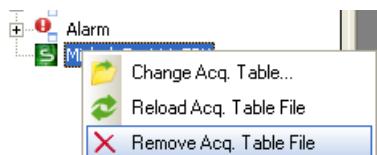
## Device Description file (.DEV)



This is always present and is assigned to the dashboard device in the SYSMA project. It can be changed using the command "Change DEV". Whenever the DEV file is changed, SYSMA performs an automatic Page / Channel check to delete those pages or channels which are no longer available in the new DEV. The DEV file is only read when opening the project and whenever the DEV is changed. If you directly modify the current DEV file you must therefore execute a *Change DEV* command to see the information updated.

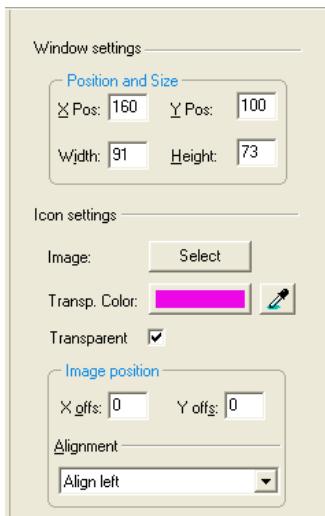
## Acquisition Table

The acquisition table is optional. It is used to set up externally acquired dashboard channels, as well as alarms and LED shifts. When changing or reloading a table, SYSMA performs an automatic channel check to delete those channels that are no longer available in the new table.



- Change Acq. Table:** to select a new acquisition table. It will be copied automatically into the project folder.
- Reload Acq. Table File:** to update the list of project dashboard channels by rereading the acquisition table from the disk. This operation is useful whenever the user has modified the table and wishes to update the project.
- Remove Acq. Table File:** to remove the acquisition table from the project.

## Item Editor bar



The content of the bar is dynamically variable depending on the object(s) selected in the page.

If no object is selected, the bar referring to the page background is proposed.

It can be hidden or displayed using the command *Show / Hide Item Bar* present in the toolbar "Dashboard".

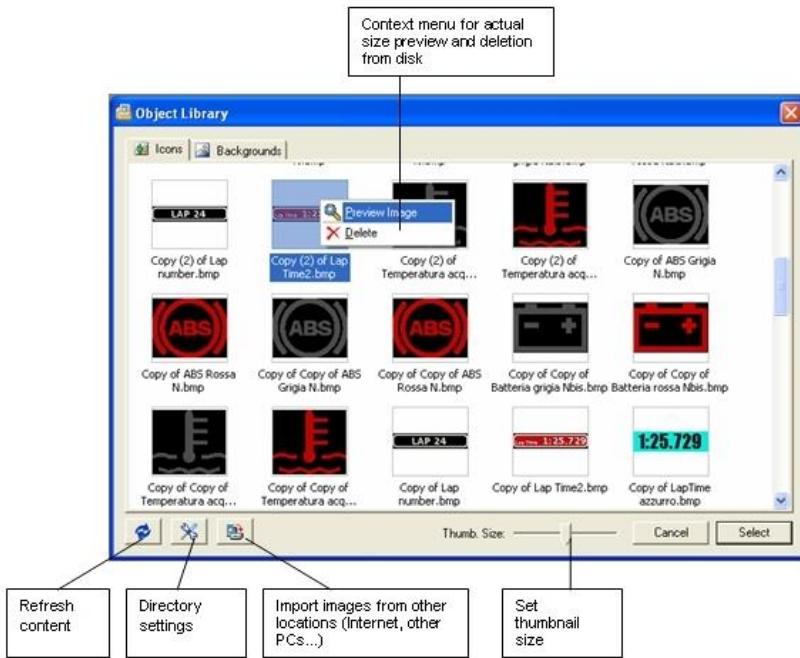
When a dashboard project is opened, the SYSMA *project workspace* bar is automatically closed and this toolbar is shown, conversely if there are no open dashboard projects, it is automatically hidden.

The different types of Item Editor bar are described in detail in the section "Basic objects".

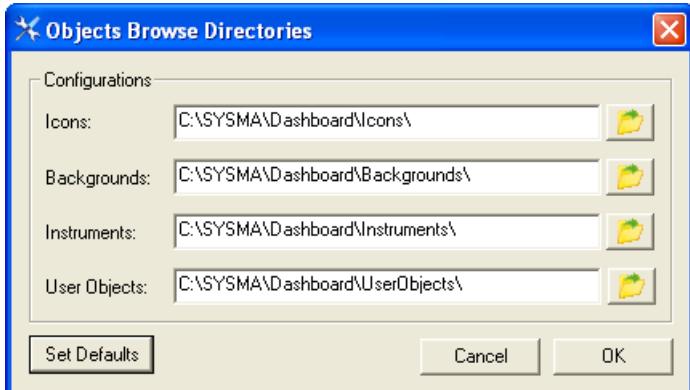
## Object Library

The Object Library object is used by SYSMA whenever it is necessary to select a library object. It is presented in different modes but the basic functions are the same in all cases:

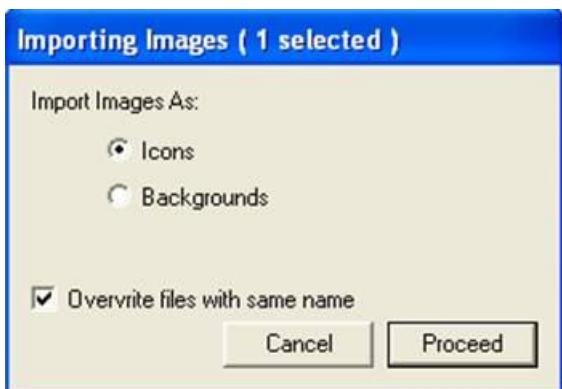
### Icon and Background Selection version



The Dashboard Editor supports only images in bitmap (.bmp) format. Images in other formats (.jpg, .tiff, .gif ...) **must first be converted into .bmp format using external tools.** The “Setup Directories” command is used to set up the global archive directories used by the program:

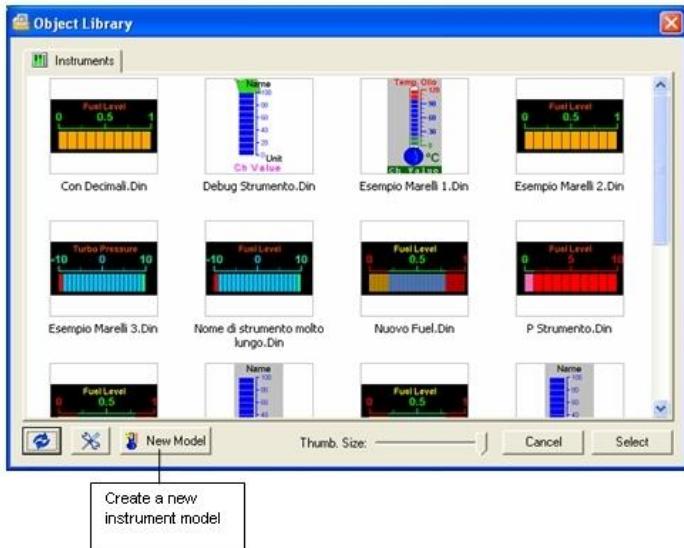


The "Import" command is used to import bitmap images into SYSMA folders so that they can be included in the Object Library. After selecting one or more images you can specify whether to import them as icons or as backgrounds.

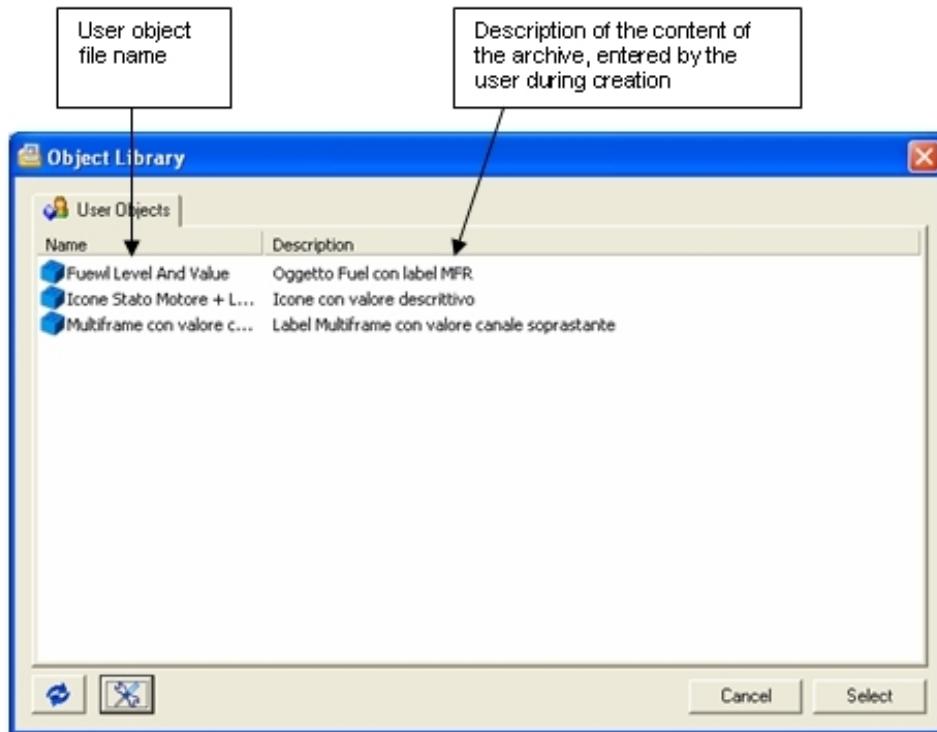


## Instrument Selection version

Only “Dashboard Instrument” (\*.din) files are displayed in this mode of the Object Library. These files can be imported manually by the user into the “Instruments” directory or created using Sysma.



## User Objects Selection Version



Only “User Object” (.Uob) files are displayed in this mode of the Object Library. These files can be imported manually by the user into the “UserObjects” directory or created using SYSMA.

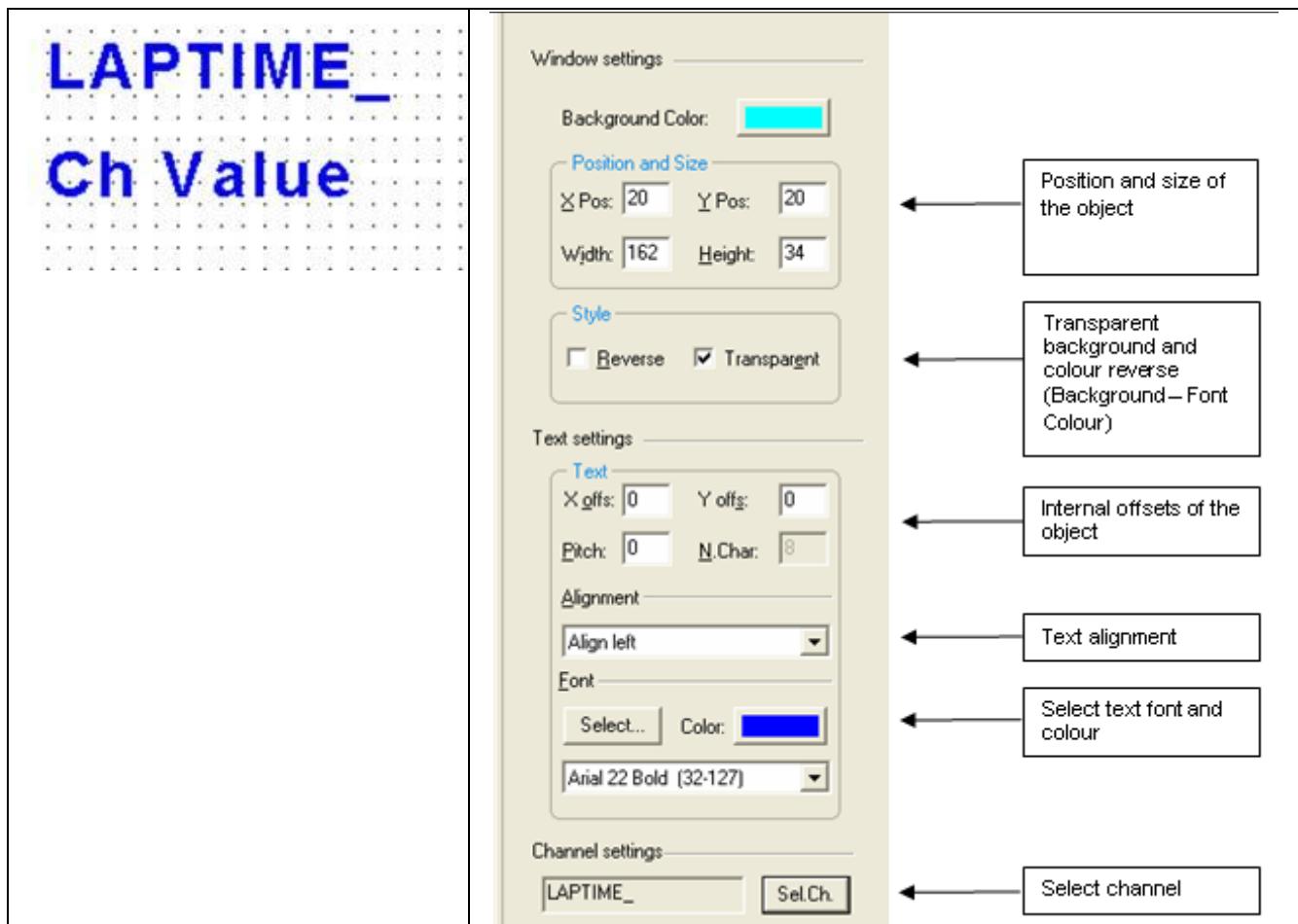
# Base Objects

Objects for editing a dashboard project can be inserted using the buttons on the main toolbar or using the context menu which appears when you right-click on the page.

The various types of object and the configuration procedures are described below.

## Channel Name and Channel Value

The *channel name* object is used to enter the name of a channel, whereas the *channel value* object displays its value.



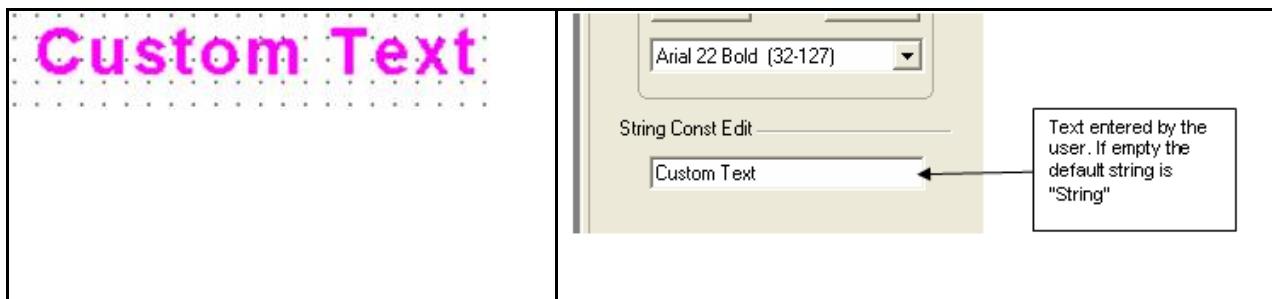
**Note on the use of fonts:** You can use any font installed in the system for text type objects by selecting it using the *Select...* button. SYSMA automatically inserts or removes it from the dashboard project.

However the font selection combo always contains the character sets already used in the project, which can be configured directly without passing via the Windows selection window.

If the project being edited has been imported from another computer, it may contain objects created using fonts, which are not installed in the current Windows system. These fonts can still be used, but the only way to configure them in new text objects is to select them using the combo.

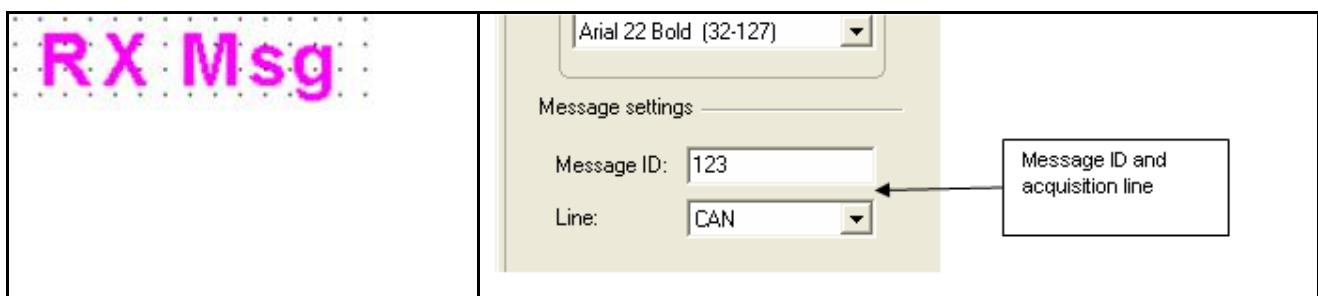
## String Constant

The *string constant* object is used to insert any string into the page. The characteristics of the text can be configured in the same way as for Channel Name and Channel Value objects.



## RX Message

The *RX Message* object enables the user to view the received message (only in *Msg* pages).



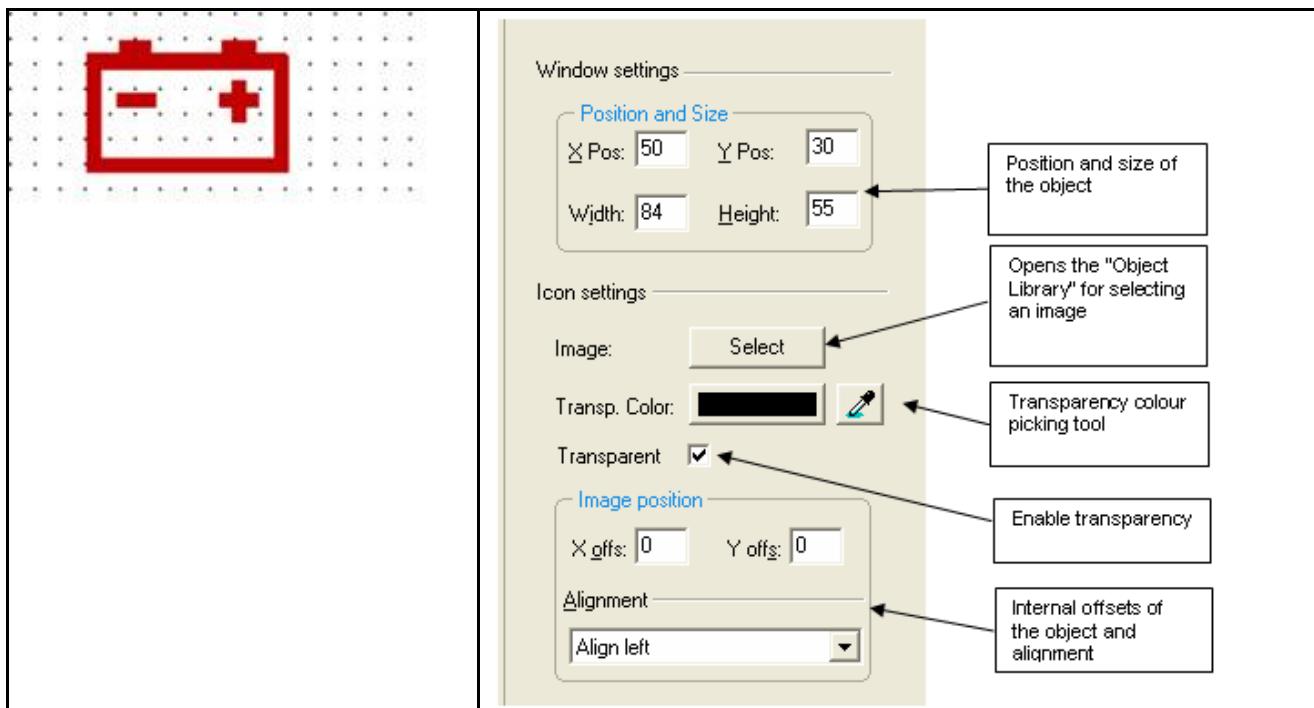
## Alarm Value , Alarm Label , Alarm Message

These three objects are usually used in the Alarm page but can be inserted anywhere. They enable the user to view the label, value and message of the active alarm.

<b>AI Value</b> <b>AI Label</b> <b>AI Msg</b>	The toolbar for these objects is the same as that for string objects. There are no special settings to configure.
---	---

## Icon

The *Icon* object is used to insert an image into the page. The image must be selected from the *Object Library*.



For use of the Object Library, see the corresponding section.

The **transparency** function is used to set one of the image colours as the transparency colour. This means that the parts of the image with this colour will be transparent and will not be drawn, thus revealing any underlying objects or the page background.

The transparency colour can be selected using the colour selection button, or picked directly off the screen. To pick a colour, press the picking tool button and left-click the mouse on the desired colour (you can press ESC to cancel).

*Technical note:* The transparency colour is identified *precisely* according to its RGB values: altering these values even by one unit changes the colour, which will therefore cease to be transparent. This may cause some problems with BMP images that are converted from JPG format, as a colour shift may occur during the conversion, especially in areas with high contrast. In this case, external photo-editing software can be used to adjust the colour tolerance levels and ensure consistency.

## Managing images in projects

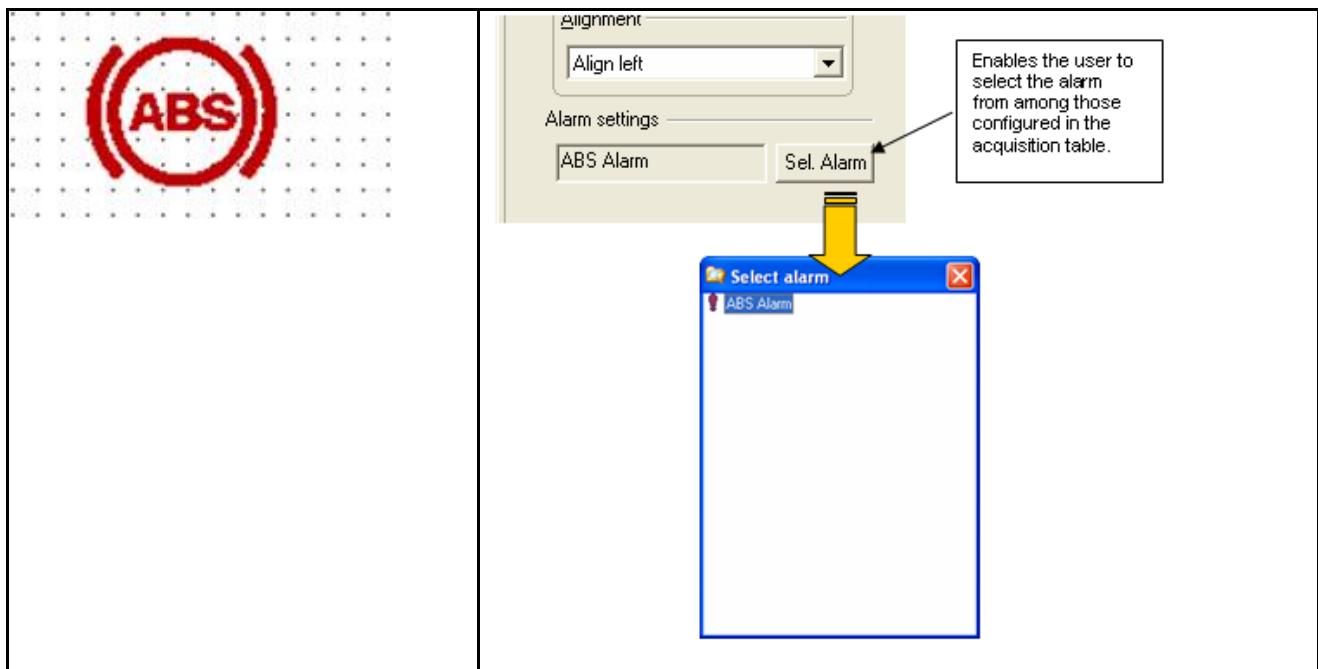
The archive of images inserted in a dashboard project is organized so as to optimize data transmission to the device. This means that an image used in multiple pages is sent to the dashboard only once. Individual images are identified in the internal database by means of their file name. This may cause problems whenever you wish to modify an image in the */icons* or *Backgrounds* directory that has already been inserted in the project. This is because SYSMA considers the image already present in the archive and uses the previously loaded version.

To force SYSMA to use the new image, there are 2 possibilities:

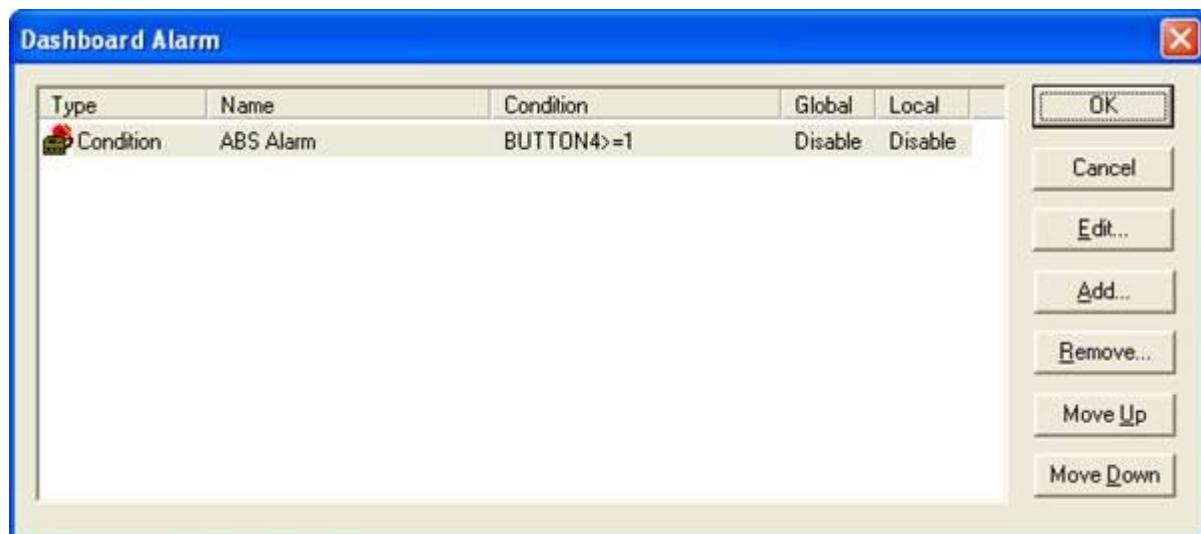
1. Rename the BMP file after modifying it
2. Remove all "old" icons from the project and reinsert them with the new version

## Icon Alarm

The Icon Alarm object consists of an icon object that is only displayed when the corresponding alarm is activated.

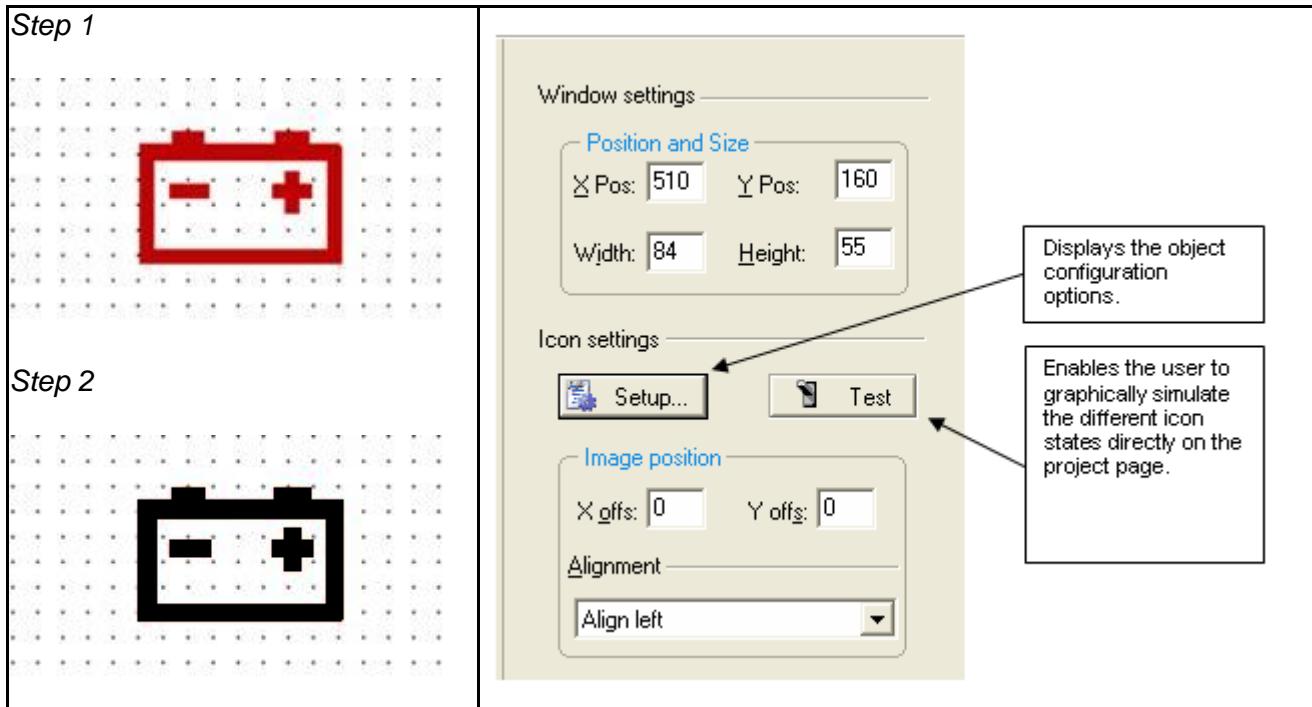


The alarms displayed in the alarm selection dialogue box are those configured in the *Dashboard Alarms* section of the acquisition table.

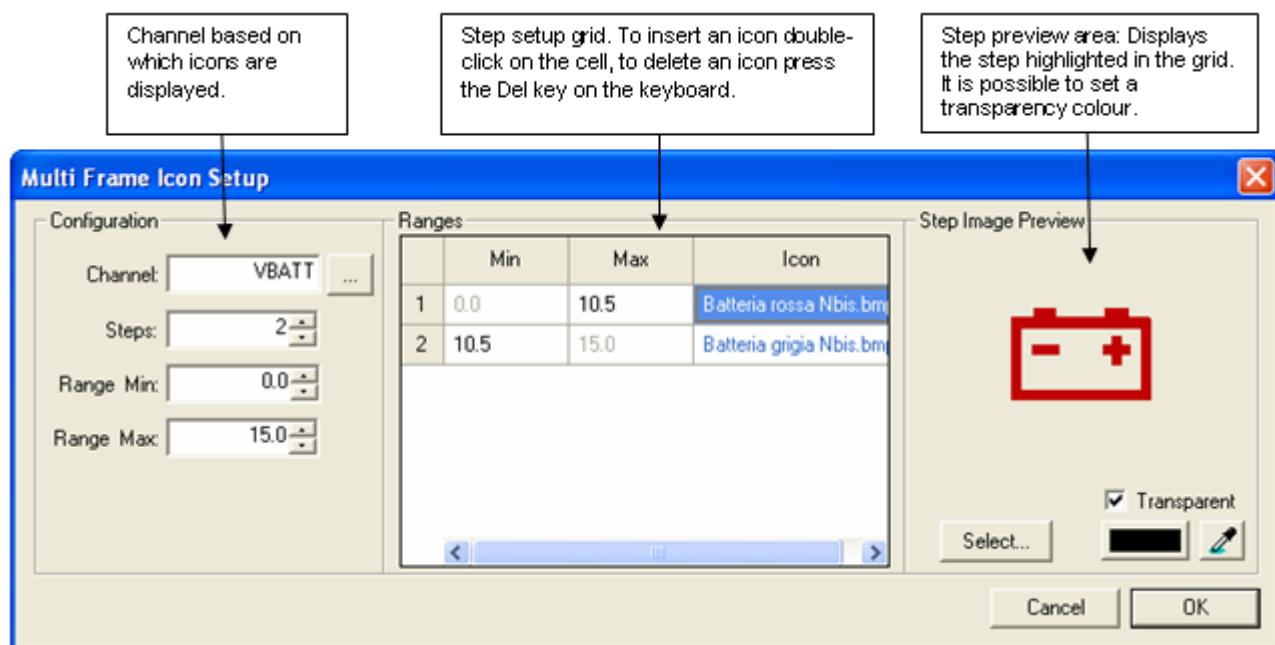


## Multiframe Icon

The Multiframe Icon object consists of a series of icons associated with specific value ranges of a channel. They are displayed alternatively according to the value of the channel at that specific time.



Object configuration:



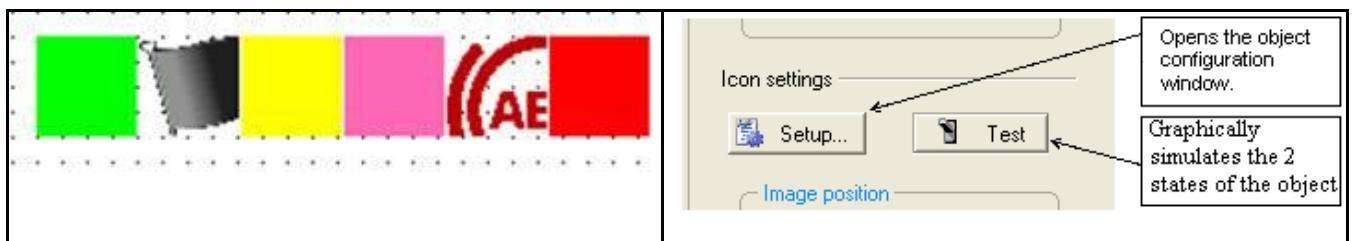
The content of the grid is updated automatically by modifying the number of requested steps or the range minimum and maximum values. All of the inserted values are accepted only if the number of decimals is consistent with the type of channel selected (unless configured otherwise by the user, values are considered as integers by default). If the value entered as the range or step is not acceptable (e.g. because it is not possible to create the requested number of steps with the selected range) the grid is not updated and the user is notified when the window is closed. In order for changes to be saved, you must have selected **one icon for each step**. However it is possible to close the dialogue window without having first selected the channel (a dialogue box will appear

requesting confirmation): in this case an error string will be displayed in the device to indicate the anomaly.

**IMPORTANT NOTE:** Multiframe icons can only be linked to "external" channels, e.g. channels configured in the acquisition table. None of the device's internal channels can be used for this purpose.

## Diagnostic Icon

The Diagnostic Icon object enables you to view one or more icons, which represent the bit state of a channel. Each individual bit can be configured with one image for the ON state and one for the OFF state. The display of one of the states can be disabled.



Object configuration:

Channel based on which icons are displayed

Selection area for choosing the bits to represent. The number of bits depends on the dimension of the selected channel.

Preview area for the two states (ON / OFF) of the bit selected in the grid. It is possible to set a transparency colour.

Positioning mode of the icons (arranged horizontally or vertically)

Configuration  
Channel: BUTTON3  
Mode: Horizontal

Bits Selection

Bit	Type	Logic	ON	OFF
0	Color	Positive		
1	Image	Positive	bandiera verda.t	bandiera nera.br
2	Color	Positive		
3	Color	Positive		
4	Image	Positive	ABS Grigia N.br	Copy (2) of ABS
5	Color	Positive		

ON Image Preview  
OFF Image Preview  
Select...  Transparent  
Select...  Transparent

Image Dimension  
Height: 40  
Width: 40  
Spacing: 1

Dimension of the bit image and spacing between one image and the next.

Setup grid for configuring the bits to represent.

The setup grid is updated dynamically when bits are selected or deselected from the selection object located at the top.

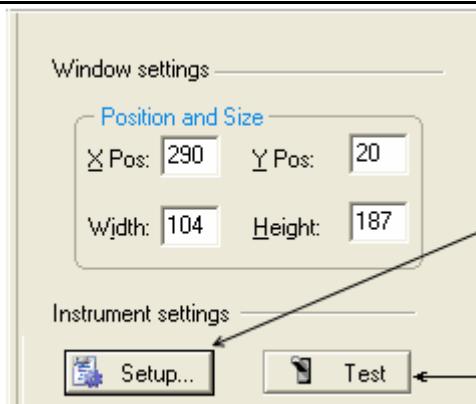
What the grid columns mean:

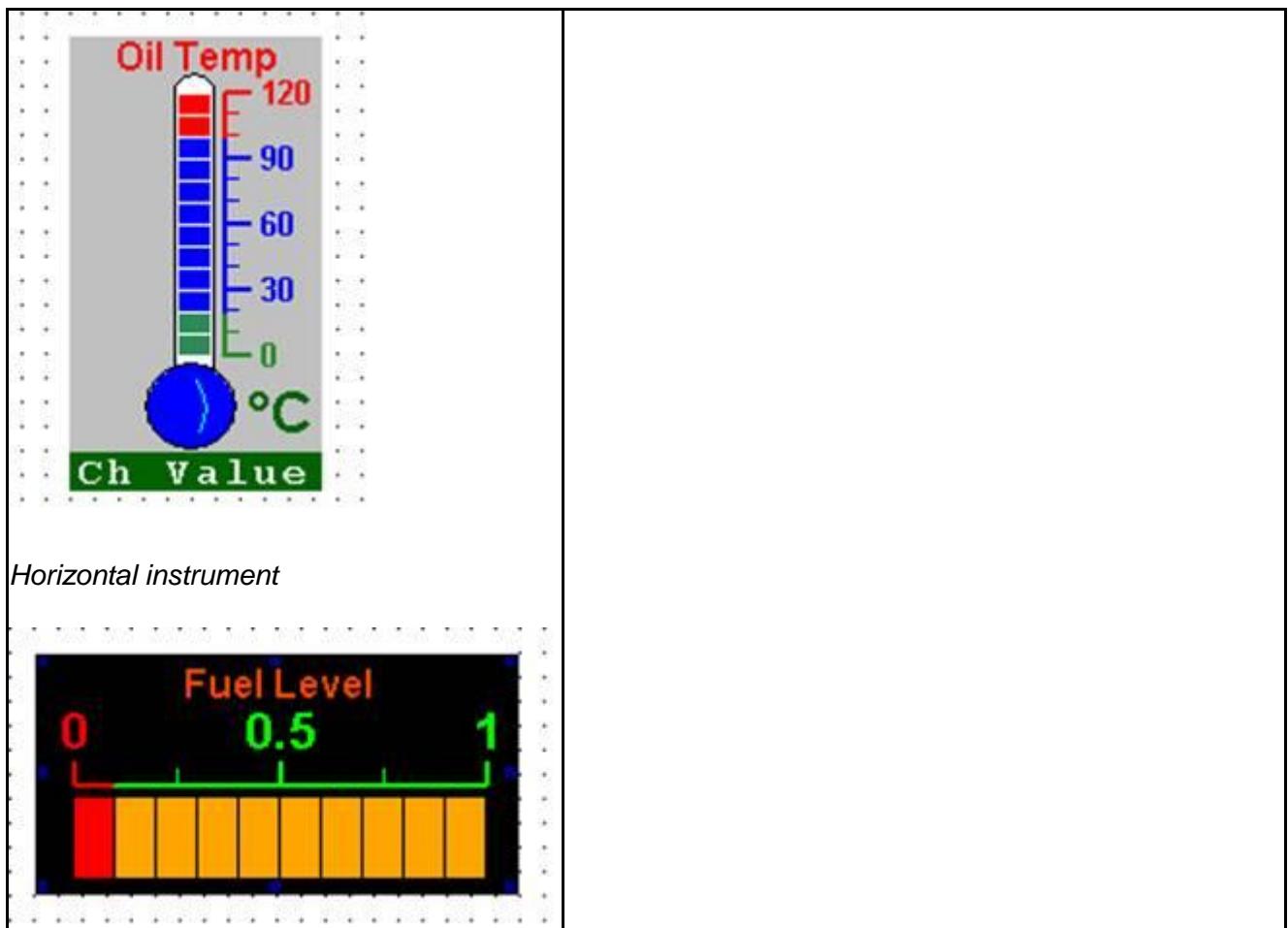
Type	Can have 2 values:  1. Color: in this case the bit will be represented by a solid coloured area according to the colour selected in the ON and OFF columns. 2. Image: in this case, an icon that the user can select from the <i>Object Library</i> will represent the bit.
Logic	Indicates the display logic: Positive or Negative
ON and OFF	Indicate the colour (if the mode is <i>Color</i> ) or the name of the image to display (if the mode is <i>Image</i> ). To modify the colour or select an image, double-click on the box, press the SPACE key or use the controls in the preview area.  <b>Note:</b> to disable the display of one of the two states, position the mouse pointer over the corresponding cell and press the Del key on the keyboard.

**IMPORTANT NOTE:** Diagnostic icons can only be linked to external "channels, e.g. those configured in the acquisition table. None of the device's internal channels can be used for this purpose.

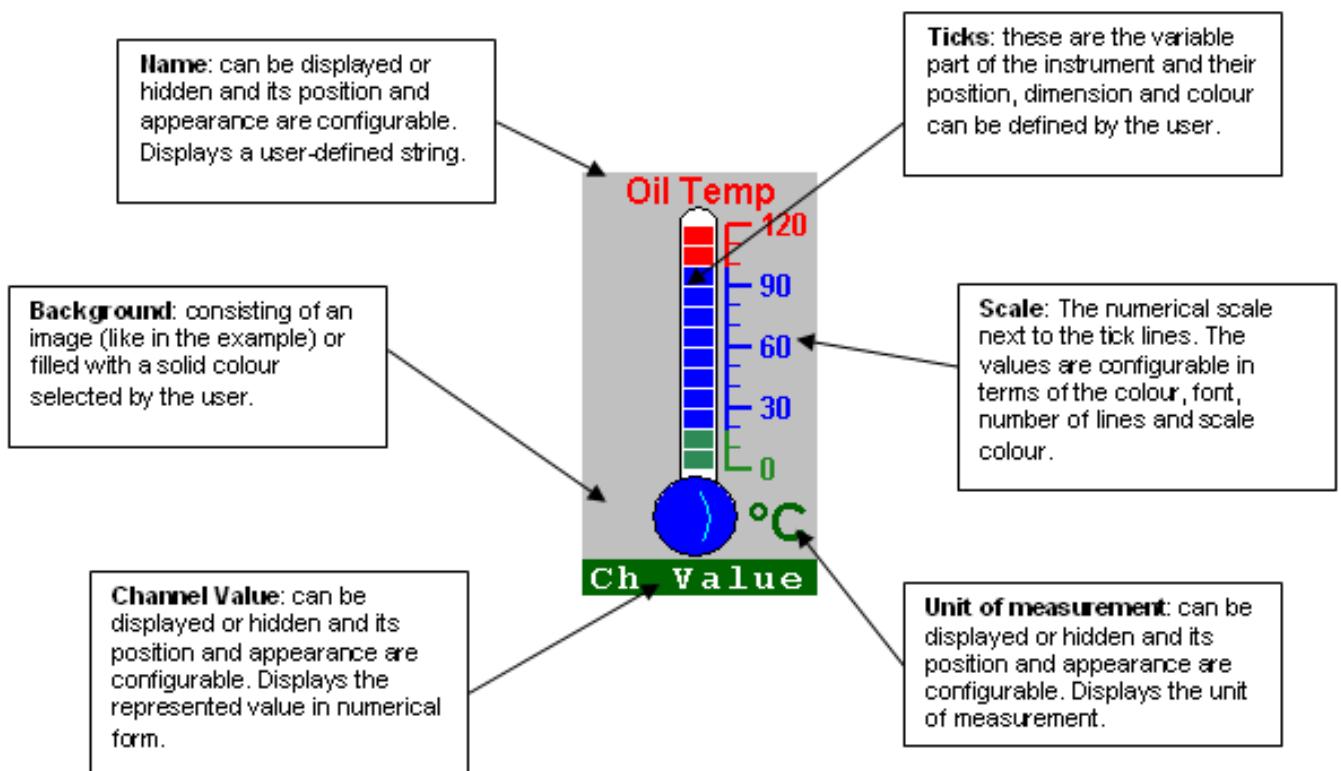
## Instrument

The Instrument object enables a value to be displayed graphically on a scale, which simulates an instrument on the console. All parts of the object can be configured thanks to a special configuration environment. You can also save a custom instrument to insert into different projects or perform import/export operations.

<i>Vertical instrument</i>	 <div style="position: absolute; left: 770px; top: 680px;"> <p>Opens the object configuration window.</p> </div> <div style="position: absolute; left: 770px; top: 750px;"> <p>Simulate the instrument bar working</p> </div>
----------------------------	---



Parts of an instrument

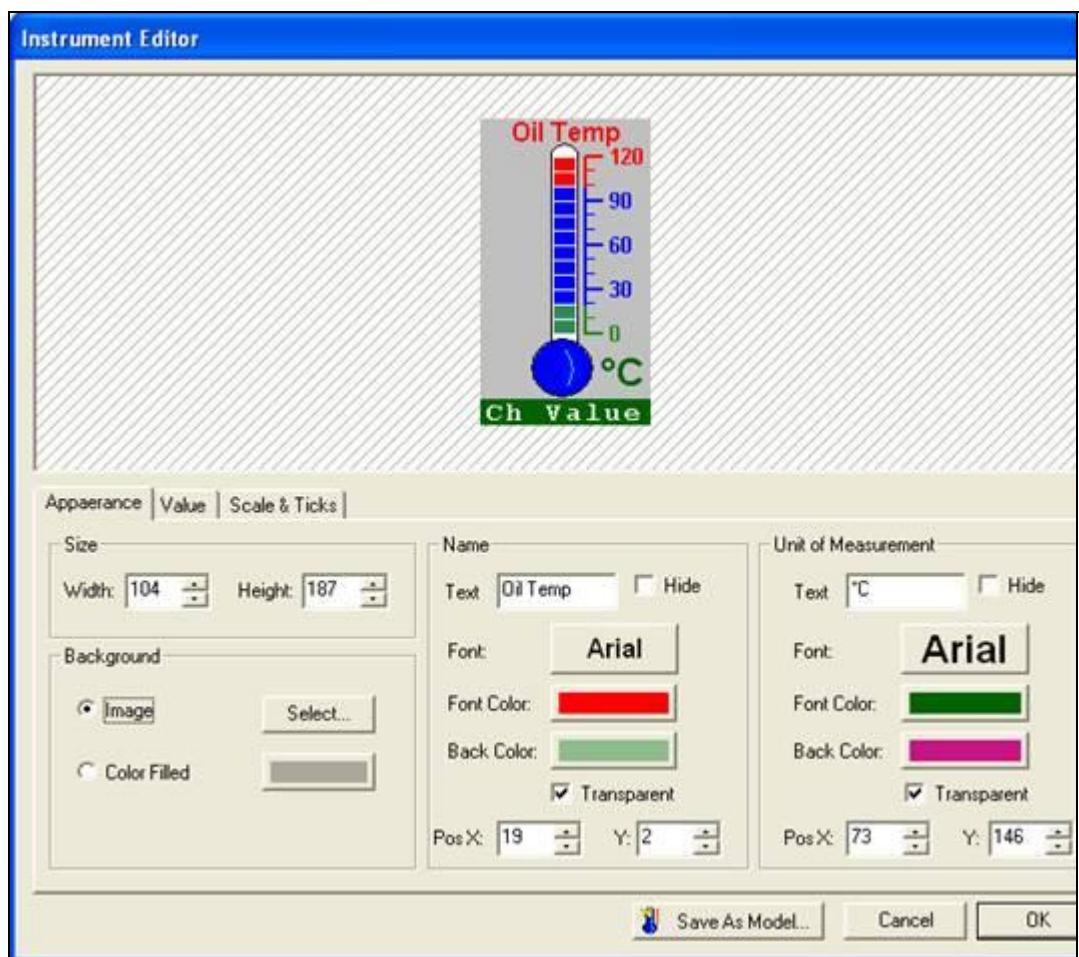


Object configuration:

#### General Notes:

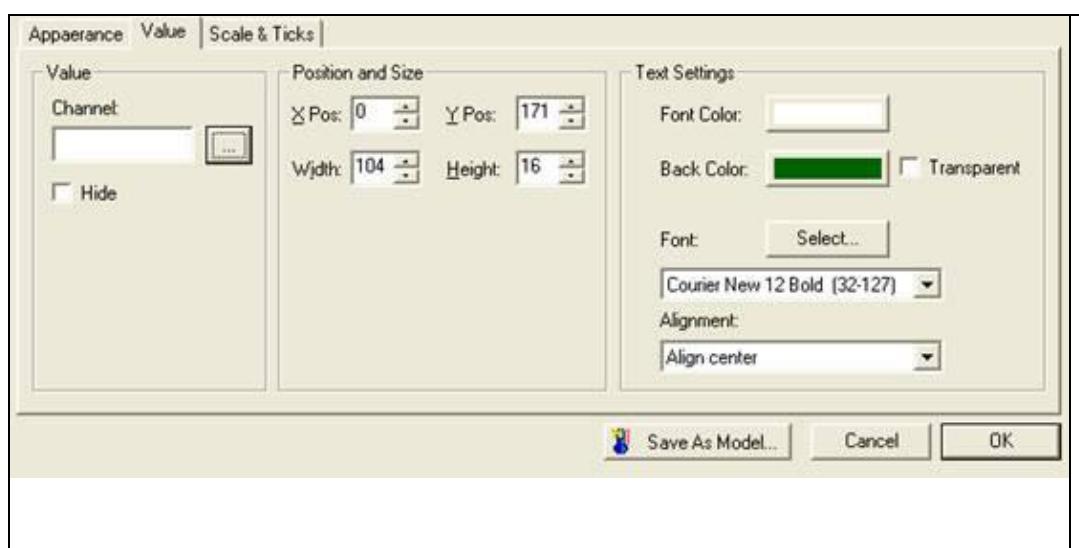
1. Numerical values can be modified in 3 ways: by entering the value directly via the keyboard, by using the keyboard arrow keys to increase or decrease the value or by using the mouse wheel.
2. When the values in the bottom part of the window are changed, the preview in the top part will be updated accordingly.
3. The *Save As model* button located at the bottom enables an instrument model to be created based on the currently selected preview. A new file with the extension *.din* will be inserted in the Instrument directory and will be available in the *Object Browser*.
4. The background of numerical cells turns **red** if the input value is not accepted by the current configuration. In this case, the value used for the instrument preview is the last valid value inserted. If the window is closed with invalid cells, a warning message notifies the user.

## Appearance Page



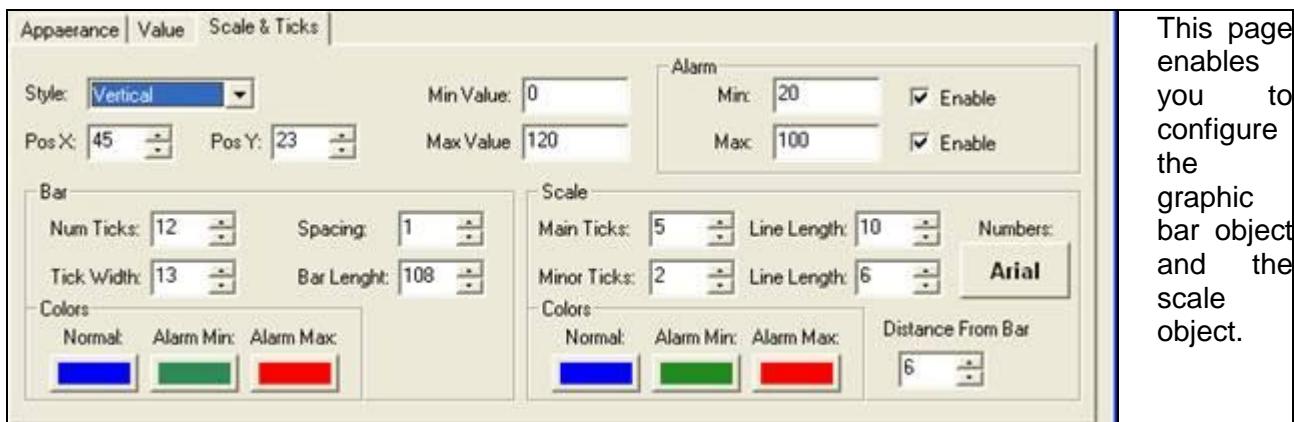
This page is used to change the background, the overall dimensions of the object, the name and the unit of measurement. The name and unit of measurement can also be hidden.

## Value Page



This page is used to select the channel to display in the instrument and, if applicable, display the text box with the value in numerical form. The editing controls are the same as those for the *channel value* basic object.

## Scale & Ticks Page



### General:

**Style:** bar style (horizontal / vertical)

**Min / Max Value:** minimum / maximum values shown on the instrument

### Bar section:

**Num Ticks:** total number of units in the graphic bar

**Spacing:** spacing between one tick line and the next

**Bar Length:** total length of the bar. SYSMA calculates the dimensions of the individual units by comparing this value with the *spacing* value

**Tick Width:** represents the width of the graphic bar if in *vertical* mode or its height if in *horizontal* mode

**Colors area:** defines the colours of the tick lines in the 3 parts of the instrument

### Scale section:

**Main Ticks:** number of main tick lines along the length of the instrument scale

**Minor Ticks:** number of secondary lines between 2 main tick lines

**Line Length:** length of the tick lines in pixels

**Distance from bar:** distance of the scale from the bar

### Alarm section:

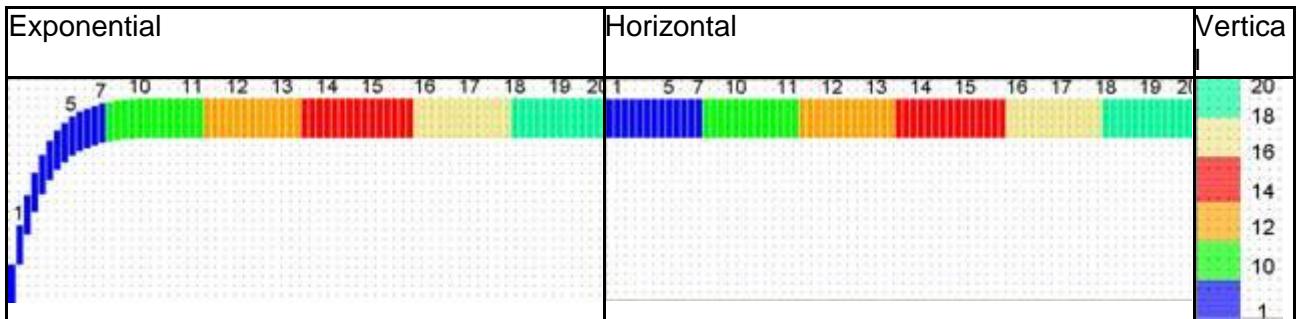
**Min and Max values:** values that delimit the 2 alarm areas

**Enable:** enable the Min and Max alarm areas

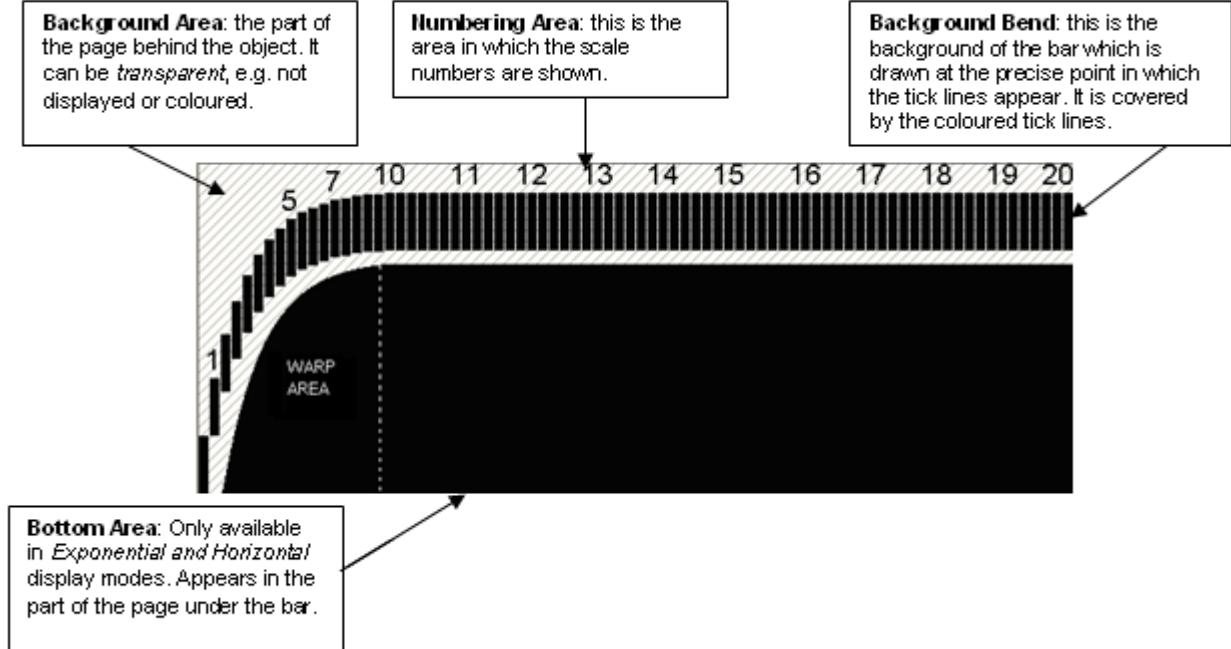
# Bar Graph

The BarGraph object, in contrast to the other objects described here, is **unique** for the entire project. This means that, if it has been inserted, it will be displayed in all pages except for MECH and system (RESET and PROG) pages. Likewise, if it is deleted or modified, the change will be applied to all the pages that contain it. It can be inserted or deleted using the *Edit* and *Remove* buttons which are displayed when no element is selected on the page.

Bargraph object display modes:



Parts of the bargraph object:



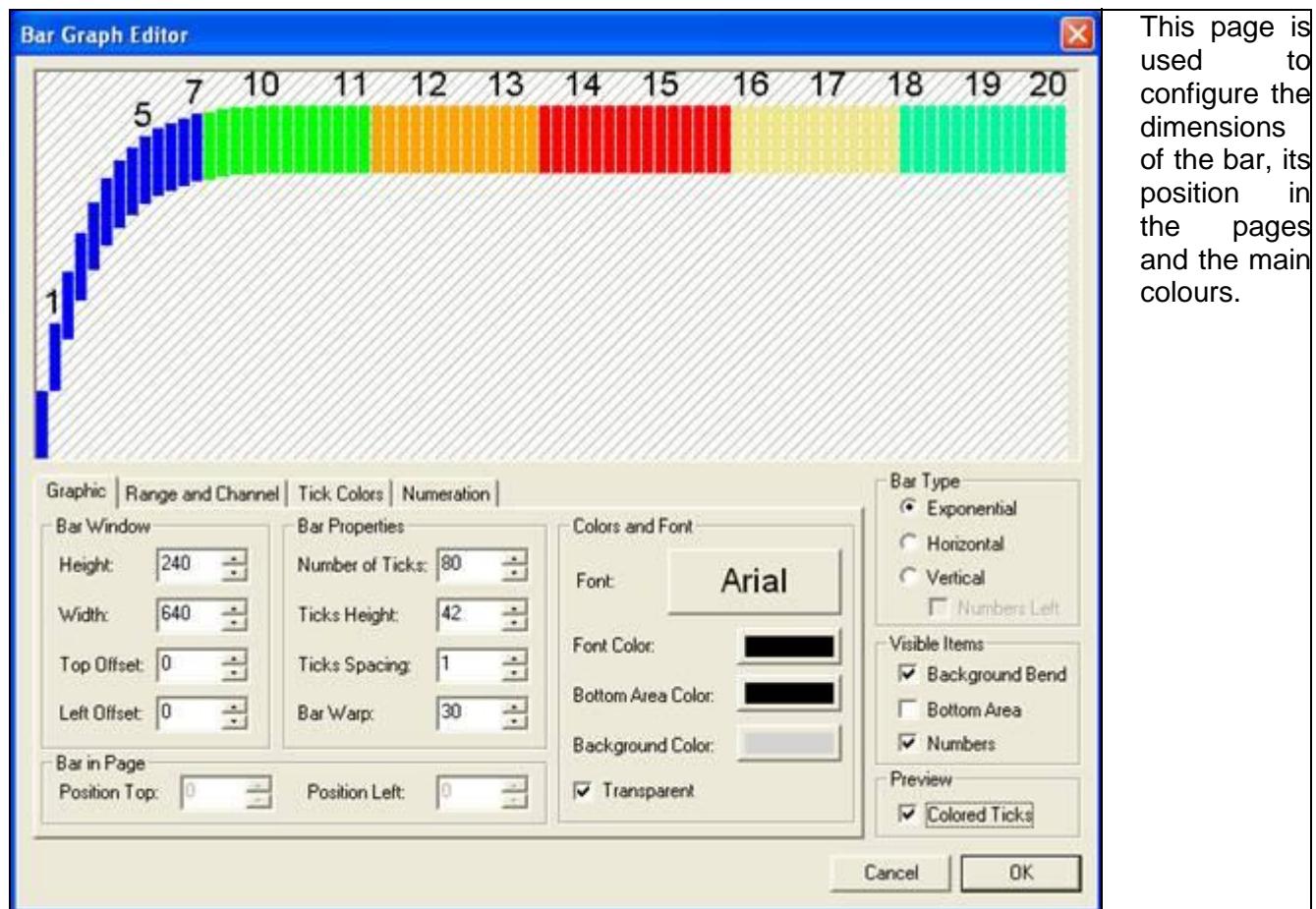
Object configuration:

## General Notes:

1. Numerical values can be modified in 3 ways: by entering the value directly via the keyboard, by using the keyboard arrow keys to increase or decrease the value or by using the mouse wheel.

- When the values in the bottom part of the window are changed, the preview in the top part will be updated accordingly.
- The background of numerical cells turns **red** if the input value is not accepted by the current configuration. The value used for the bar preview is, in this case, the last valid value inserted. If the window is closed with invalid cells, a warning message notifies the user.
- On the right side of the configuration window, you can select the desired type of bar (*exponential*, *horizontal* or *vertical*), which parts of the bar to display and whether to preview the ticks with the configured colours (these cover the background bend, if active).
- The configuration page take into account any hardware limitations that must be respected: for example, if the configuration can only contain a certain number of icons in order to stay within the limitations, it will not be possible to insert an excessive number of ticks.

### Appearance Page



### Bar Window section

Height / Width	Overall dimensions of the bar
Top / Left Offset	Top / left offset of the bar with respect to its area

## Bar Properties section

Number of ticks	Number of tick lines which comprise the bar
Ticks Height	Height of the tick lines
Ticks Spacing	Spacing between one tick line and the next
Bar Warp	Dimensions of the exponential curve area of the bar

## Bar In Page section

Position Top / Left	Positioning of the bar area with respect to the device page. Only available if the Bar Width and Height are less than the page size.
---------------------	---

## Colors and Fonts section

Font	Select the font used for the scale numbers
Font / Bottom Area	For setting the colours of the different areas.
Background Color	
Transparent	If active, the background of the BarGraph is not displayed; otherwise it is filled with the selected colour.

## Range and Channel page

Graphic	Range and Channel	Tick Colors	Numeration												
<input type="text" value="Bar Min: 0"/> <input type="text" value="Bar Max: 20000"/> <input type="text" value="Ranges: 2"/> <input type="text" value="Channel: CAN_SLO"/>	<table border="1"> <thead> <tr> <th></th> <th>Min Value</th> <th>Max Value</th> <th>Tick Number</th> </tr> </thead> <tbody> <tr> <td>Range 1</td> <td>0</td> <td>10000</td> <td>18</td> </tr> <tr> <td>Range 2</td> <td>10001</td> <td>20000</td> <td>62</td> </tr> </tbody> </table>		Min Value	Max Value	Tick Number	Range 1	0	10000	18	Range 2	10001	20000	62		<p>In this page you can define the minimum and maximum values displayed on the BarGraph and the ranges of values for calculating the ticks.</p>
	Min Value	Max Value	Tick Number												
Range 1	0	10000	18												
Range 2	10001	20000	62												

The ranges enable you to create a bar with a **non-linear** trend line. Just as the example shows, you can specify that the first 18 ticks represent values from 1 to 10000 and the next 62 ticks represent values from 10001 to 20000. In this way the area from 10001 to 20000 has a higher resolution than the preceding area.

## *Tick Colors page*

	Start Tick	End Tick	Tick Color	Background Color
1	1	13	Blue	Black
2	14	26	Green	Black
3	27	39	Orange	Black
4	40	54	Red	Black
5	55	67	Yellow	Black
6	68	80	Cyan	Black

In this page you can define the colours of the tick lines on the bar when they are active.

## *Numeration page*

1	6	11	16
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

In this page you can define the numbers to display on the scale and the scale factor for the graphical representation.

# **Editing Operations**

## **Snap and grid settings**

The grid settings of a project can be configured using the “Grid Settings” command .

The settings window enables you to configure the following:

1. Display or hide grid.
2. Grid colour.
3. Snap to Grid (objects are automatically aligned with the grid points).
4. Vertical / horizontal spacing of grid points.

These settings are common to all pages within the same project.

## Page zoom



The zoom tool can be used to increase or decrease the size of pages to facilitate editing operations. The zoom will change the size to a fixed percentage: 100% - 200% - 400%.

## Inserting objects

There are 2 ways to insert objects in a page:

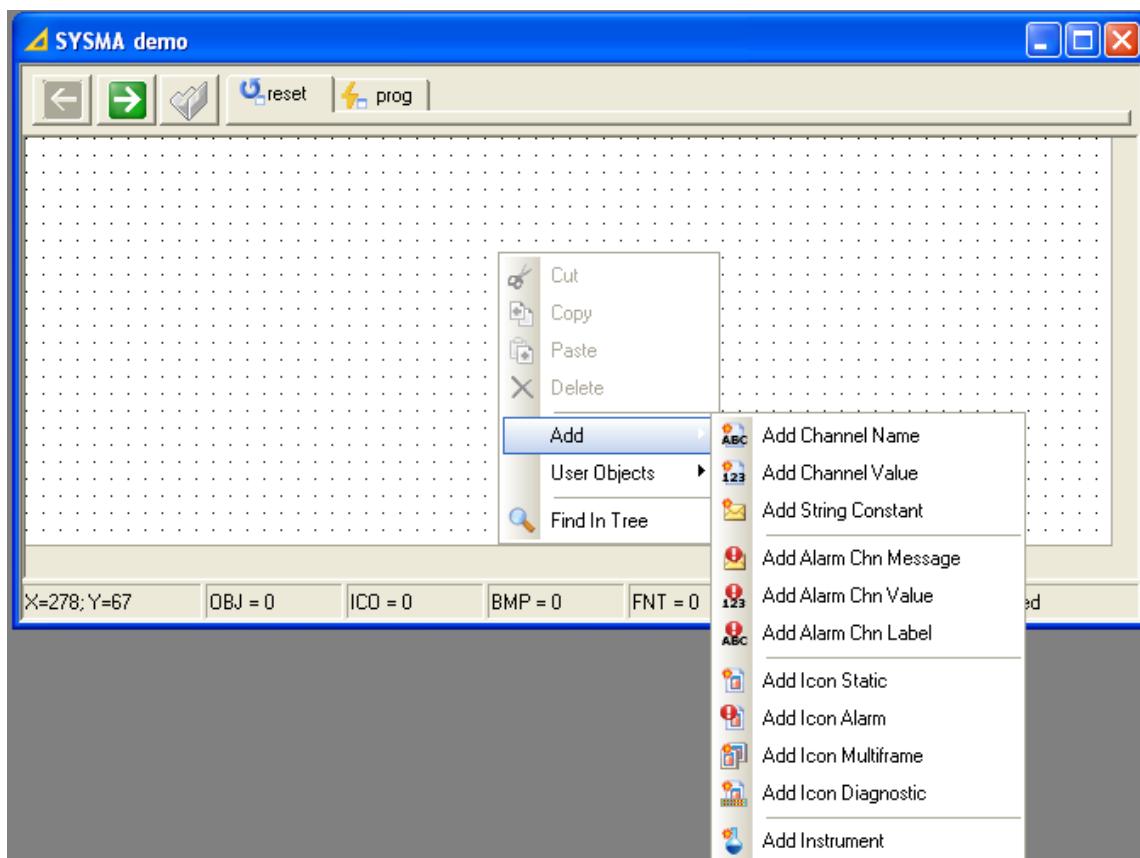
1. Inserting objects via the system menu / toolbar.

Use the toolbar command or the command on the menu Dashboard Add, which represents the object that you want to insert and click on the page at the position where you want to put the object.

You can cancel the operation by pressing ESC at any time.

2. Inserting objects via the context menu.

Right-click on the position of the pages where you want to insert the object and select the type of object from the "Add" menu.



If an object is inserted which involves selecting an image or a basic configuration, the corresponding window will automatically appear.

## Selecting multiple objects

### Rubber band selection mode

You can create a selection rectangle by clicking the mouse button and dragging the mouse over an area of the page. All objects within the rectangle will be selected.

### CTRL key selection mode

You can add objects to the current selection by pressing and holding the CTRL key.

**IMPORTANT NOTE:** selecting with the CTRL key pressed does not change the stacking order of overlapping objects (Z axis).

## Moving objects

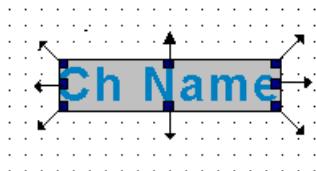
You can move selected objects around the page in the following ways:

1. Using the mouse (dragging with the left-hand mouse button pressed, then releasing it).
2. Using the keyboard arrow keys: the objects are moved 1 pixel at a time in the chosen direction.
3. Using SNAP: press and hold the CTRL key while using the arrow keys, the objects snaps to the grid points.

## Resizing objects

Objects can be resized in two ways:

1. With the mouse (using the object sizing handles).

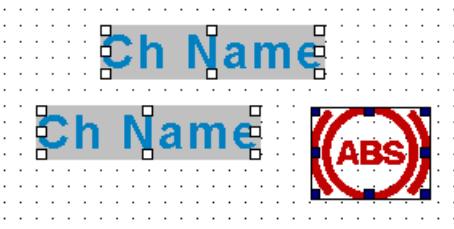


2. With the keyboard.

To resize via the keyboard, hold SHIFT while using the arrow keys (you can combine with CTRL to resize with Snap to Grid)

## Aligning objects

In the case of multiple selections, you can apply a series of commands to align / resize the selected objects based on the main object. The main object of the selection is identified by the selection rectangle with the black handles.



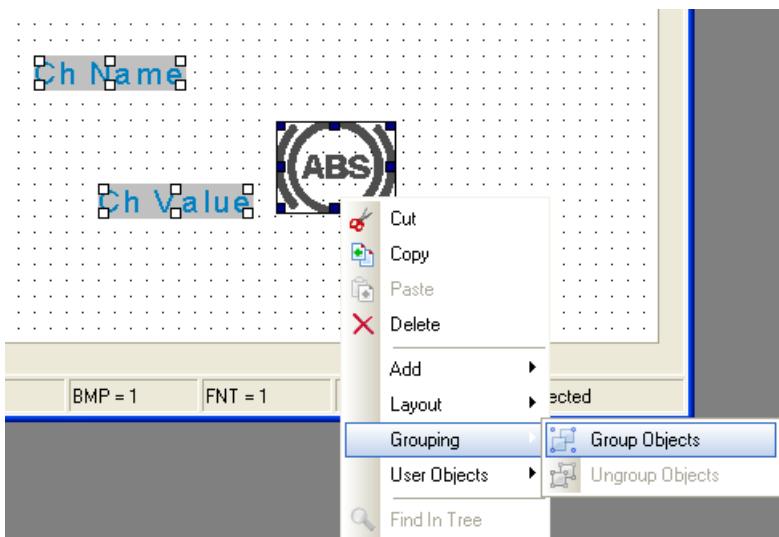
In this example the main object is the ABS icon. ALL operations refer to it.

You can access the alignment commands via the “Size And Position” toolbar, via the SYMA menu (Edit->Size And Positions) or via the context menu by right-clicking the mouse.



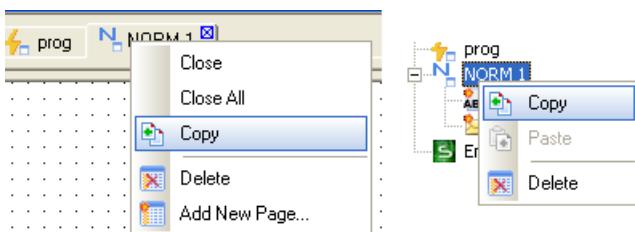
## Grouping objects

You can group 2 or more objects so that they are treated as a single object, enabling them to be moved, copied, deleted or manipulated as one. When grouping objects, the stacking order (Z-Order) of the objects is also saved.



## Copying objects

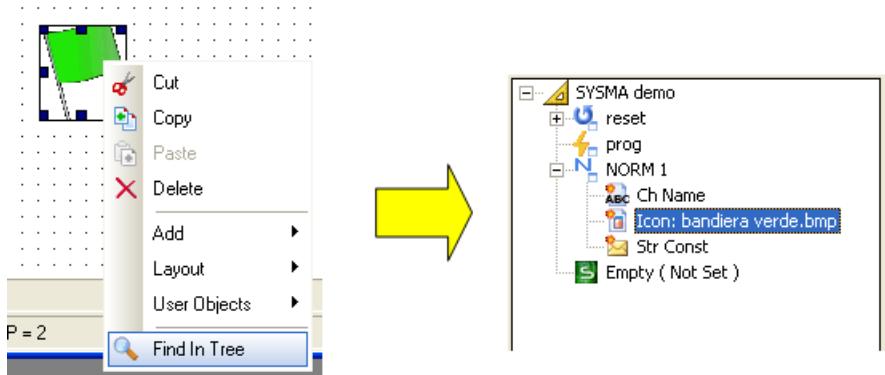
All objects (with the exception of the BarGraph object) present on the pages can be copied and pasted on the same page, on a different page of the same project or on other projects. If these objects are linked to a channel that is not present in the destination project, a warning will inform the user so that he/she can check the settings. The **BarGraph** object can however be copied from one project to the next by dragging and dropping. You can also copy and paste **entire pages** using the copy command on the Workspace bar or by right clicking on the tab of the active page.



You can always drag and drop any object using the Workspace bar.

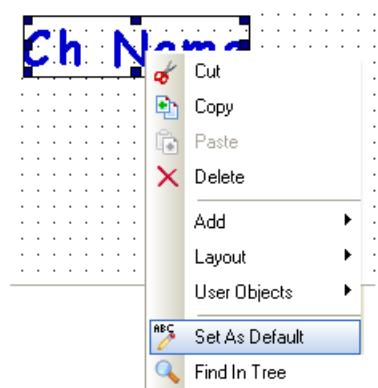
## Locating objects in the Workspace bar

You can automatically search for a given object displayed on the page (or even the page itself) in the side tree. Use the command “Find in Tree” to search for the object in question.



## “Set As Default” function for text objects

The “Set As Default” function is available in the SYSMA menu and in the context menu (right-click) for all text objects.



This function sets, for the whole system rather than just the currently active project, the default appearance and characteristics of subsequent text objects that will be inserted.

Specifically, the font, colour and transparency of the active object are saved and applied as default settings for subsequent objects.

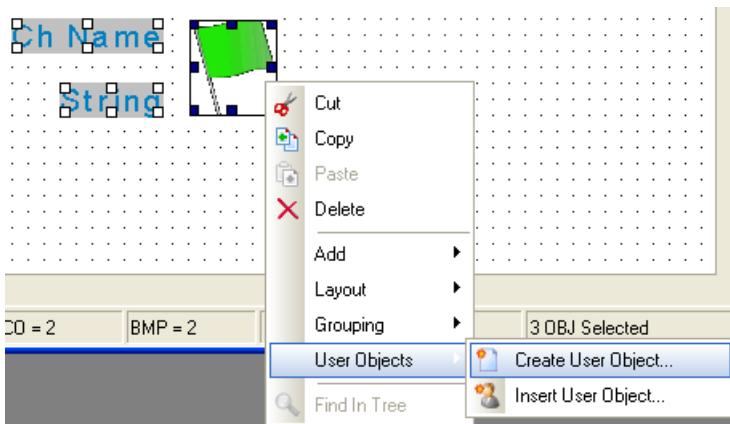
## Creating and using custom User Objects

In SYSMA Dashboard Editor it is possible to create complex objects consisting of one or more basic objects, and to save them in special files called *User Object Files* so that they can be conveniently inserted in projects at a later time.

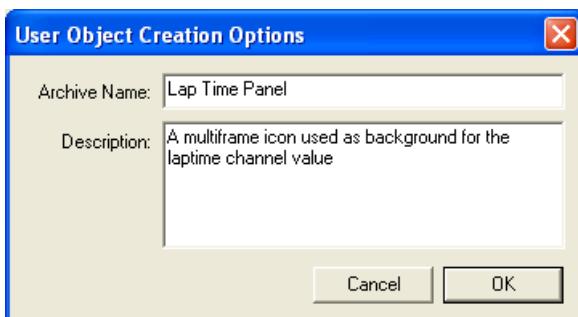
User Objects files have the extension “.Uob” and by default are archived in the “UserObjects” directory. They are then displayed in SYSMA and selected via the *Object Library* dialog box.

A User Object contains **all data** need to exactly reproduce the objects from which it was generated (images, fonts, position of the objects along the Z axis...). It is possible to **export** these files or send them to other users.

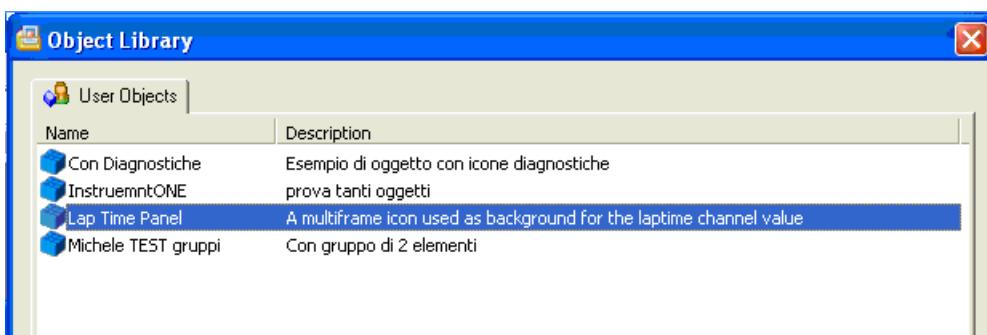
To create a custom User Object, select one or more objects (by using CTRL to preserve the stacking order, if necessary) and use the system menu or context menu (right-click) command “Create User Object”.



During creation of a new object the program will request the name of the file to create and a brief description of the object itself:



To insert a User Object in a page, use the command “Insert User Object” and the *Object Library* will appear with a list of available objects:

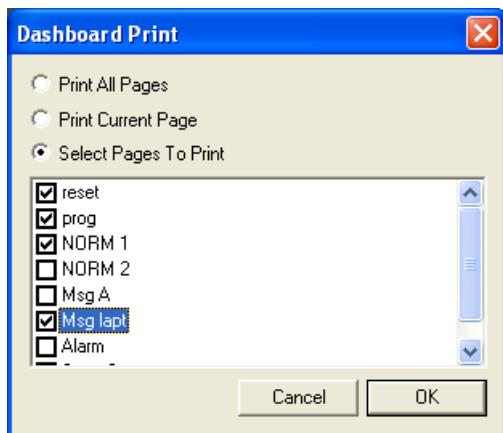


NOTE: the objects that make up a User Object are automatically grouped during the insertion phase. To ungroup them, use the command “*Ungroup Objects*”.

An object within a User Object may also be linked to a channel that is not available in the destination project. In this case the user will be notified with a warning message so that he/she can check the settings at a later time.

## Printing projects

Dashboard Editor projects can be printed using the following options:



*Print All Pages*: Prints all the pages in a project

*Print Current Page*: Prints only the page which is currently displayed

*Select Pages To Print*: Enables you to select which pages of the project to print

## UNDO / REDO

All changes made to the project configuration can be undone (CTRL+Z) or redone (CTRL+Y).

## Brief description of a DEV file for Dashboard project:

The key characteristics of the DEV file for use with the Dashboard Editor environment are indicated below. Generally speaking, this file **must not be edited by the user**.

[Section1]	
Name = DDU01	<b>Width / Height</b> : Dimensions in pixels of the connected hardware display
Function = Dashboard	
Dashboard_Model = DDU01	
Rotation = 0	<b>Width_Display_Satellite / Height_Display_Satellite</b> : (optional with default = 0) dimensions of connected satellite display, if any
<b>Width</b> = 640	
<b>Height</b> = 240	<b>Line*</b> : Communication line to the device (CAN or ETHERNET). If not indicated the default is ETH.
<b>Width_Display_Satellite</b> = 0	

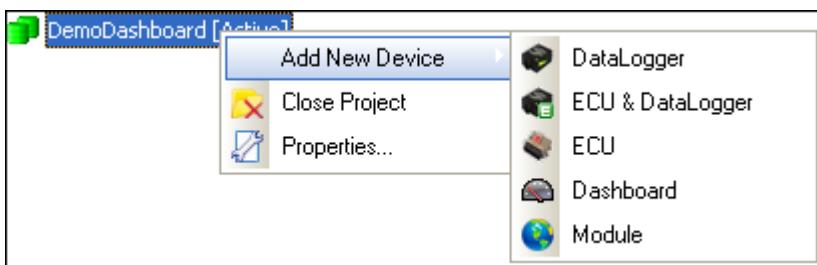
<b>Height_Display_Satellite</b> = 0  <b>Line</b> = CAN	
Buffer = 256  CmdBox = 0x0388  DataBox = 0x0389  CmdPc = 0x01e8  DataPc = 0x01e9  Signature = 0x060c	Specific communication parameters.
InternalCh1 = SE_1  InternalCh2 = SE_2  InternalCh3 = SE_3  InternalCh4 = SE_4  InternalCh5 = SE_5  InternalCh6 = ACC_X,3  InternalCh7 = ACC_Y,3  ...  Page0 = Reset  Page1 = Prog  Page2 = NORM 1  Page3 = NORM 2  Page4 = NORM 3  Page5 = NORM 4  ...	Specific internal channels of the device. By default they are all INTEGER channels.  For example, in the case of "ACC_X,3" the channel is deemed to have 3 decimals.  Pages supported by the hardware device.

\* The CAN adapters supported by SYSMA are PEAK USB adapters.

## Project Editing

### Working with Dashboard Projects in SYSMA

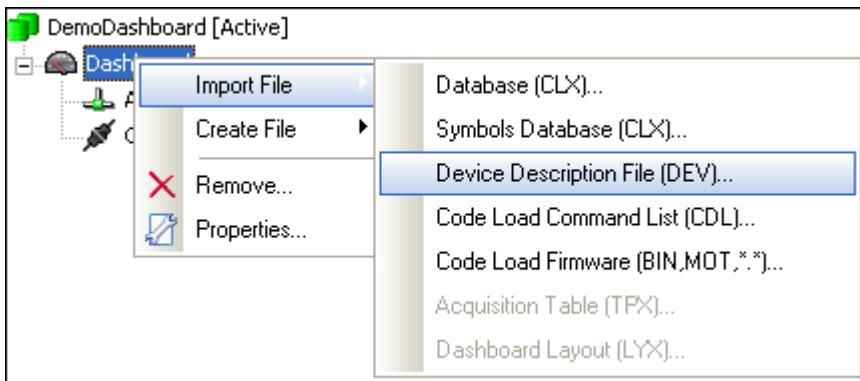
To allow the dashboard editing in SYSMA the project must contain a device of type “Dashboard”.



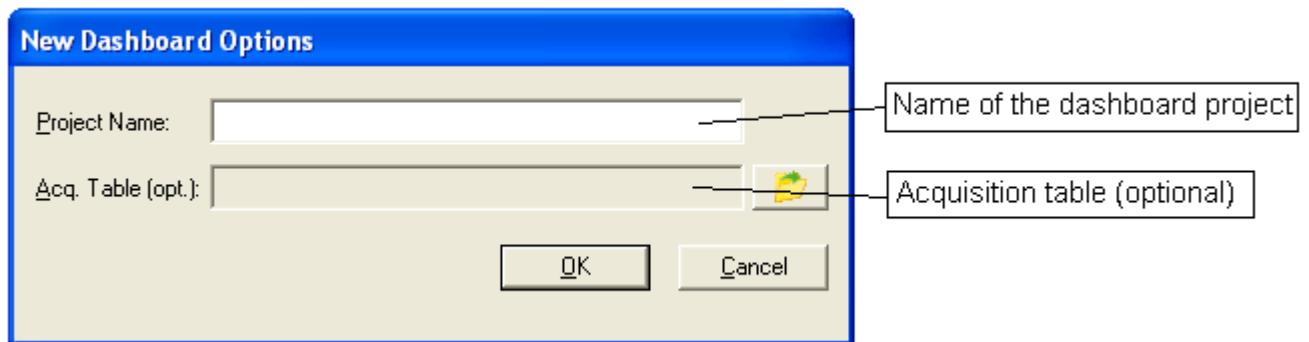
Now you can create a new dashboard configuration or import an existing project.

### Creating a new project

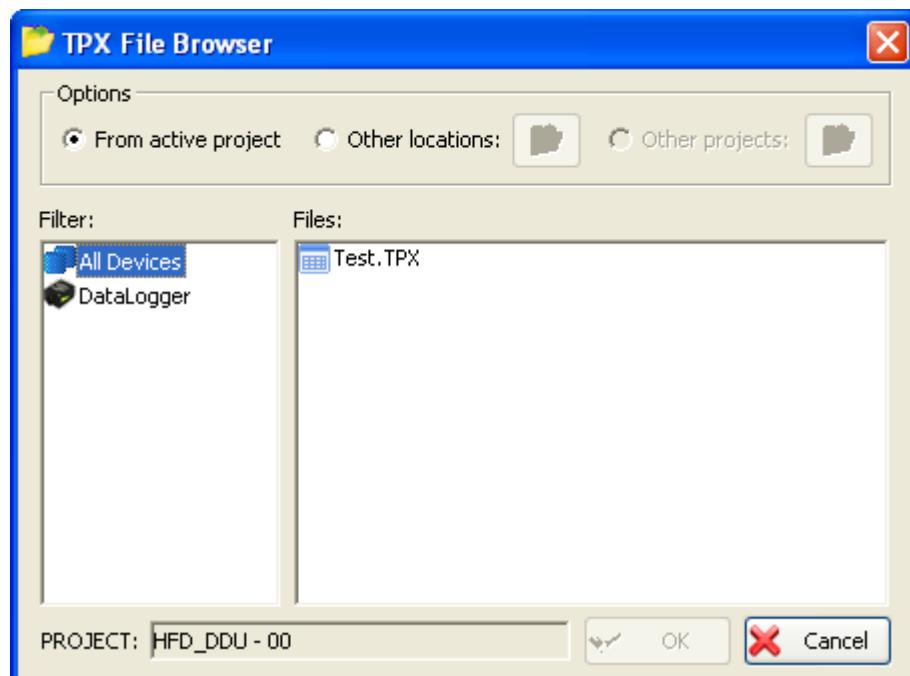
To create a new dashboard project, you must firstly add the Device Description file (.DEV) to the device by right click on it:



then use the command “*New Dashboard*”  from the system menu “Dashboard->New Dashboard” or from the Dashboard Toolbar.



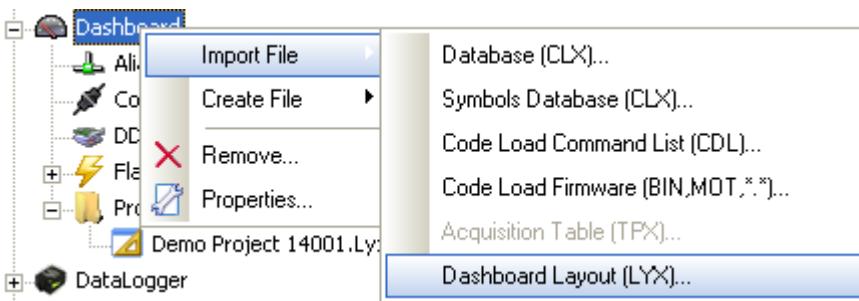
The acquisition table can be selected from the list of the tables already present in the SYSMA project or from another location using the browse option:



NOTE: SYSMA automatically insert in the project the browsed acquisition table if it's external to the active project.

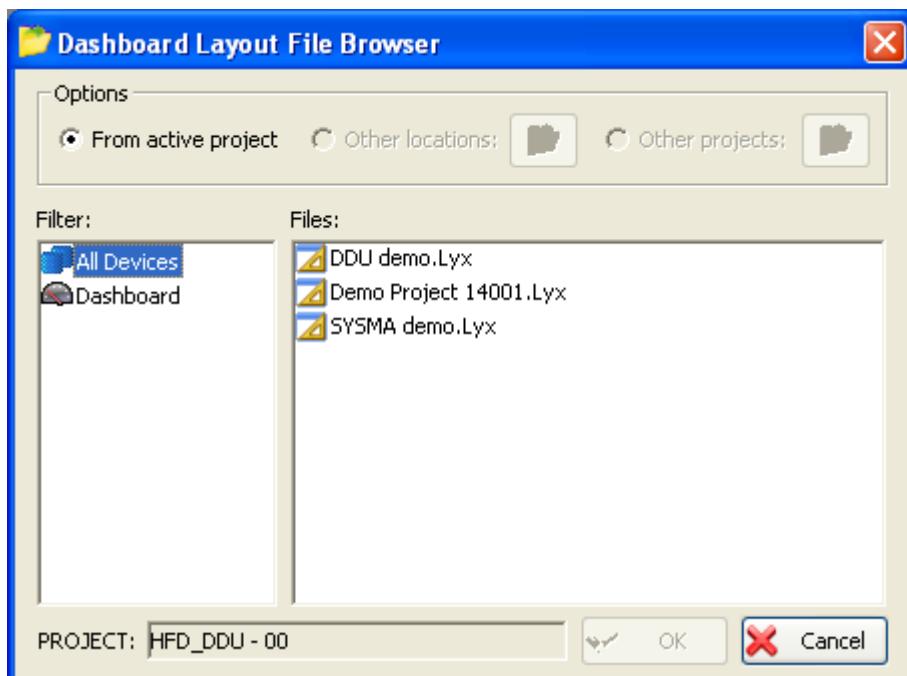
## Importing an existing project

An existing dashboard project created from SYSMA or from another project can be imported using the menu:



## Loading a dashboard project

To load a dashboard project use the command “Load Dashboard”.



## Save Dashboard As

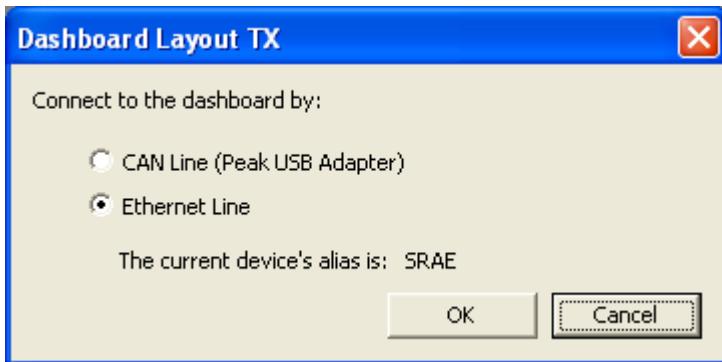
It is possible to save a dashboard layout using the command *Save Dashboard As...*. In this case a new project will be created and added to the SYSMA project.

## Transmitting a project to the device

To transmit a project to the device, the following conditions must be met:

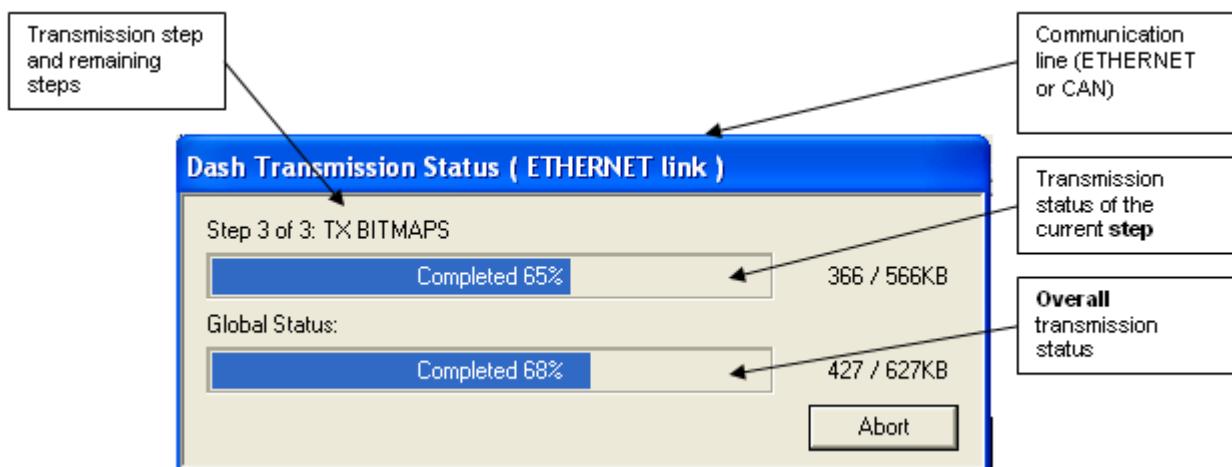
1. The Device Description file (.DEV) file must correspond to the connected device (communication parameters, display size, communication line...).
2. The limitations imposed by the hardware must not be exceeded (no red warning must be present in the project lower status bar).

Select command *Transmit Dashboard Configuration* from menu *Dashboard*, or corresponding button on *Dashboard Editor* toolbar  In the window that appears, select the communication line (ETH or CAN).



## Transmission status

During transmission of the configuration a status window is displayed, which enables you to monitor each step of the operation.



While SYSMA is transmitting the data to the device, you can still continue to work on the project that is being transmitted, since a copy of the configuration is made when the TX command is sent.

**IMPORTANT:** The transmission function automatically recognizes whether or not the 3 tables, which comprise the configuration have been modified with respect to the tables present in the hardware device. This means that only **new or modified** data will be sent.

For example, if since the last transmission you only changed the position of an object, only 1 out of 3 steps will be transmitted (the step relating to positions), while those relating to unchanged data (Bitmap and Fonts) will not be resent.

# Code Load

The SYSMA Code Load function allows the loading of the embedded software into the Magneti Marelli Motorsport electronic products.

## Definitions

The SYSMA integrated Code Loader allow the communication with electronic devices (BOX) over a communication line (LINE) using a variety of standardized commands (PROTOCOL). Each BOX contains one or more microprocessors (MICRO) each of which is referenced by the PROTOCOL through a unique identifier (DESTINATION ADDRESS).

The SYSMA Code Loader allows you to build up complex sequences of exchanges between PC and BOX; these are known as JOBS. A typical JOB is the code load operation, which is normally made up of a series of commands including memory erase, write to memory and verify code.

For each BOX, all the information concerning the communication line and protocol which connects the BOX with the PC is contained in a Device Description file with extension \*.DEV.

The list of JOBS and related contents is defined in a file with extension \*.CDL.

## Code Load Configuration

Each device present in the project can have (optionally) a *Firmware* node that allows the programming of the embedded firmware.

### Compatibility note:

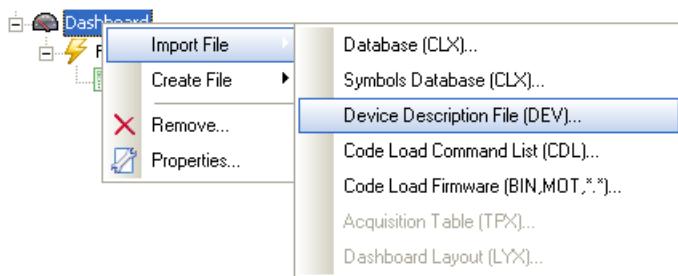
The SYSMA Code Load file (.CDL) is fully compatible with the ExeFiles program so it can be imported from already prepared configurations.

### New Firmware node

A new firmware node can be created using the context menu:



Now you must provide a Device Description file (.DEV) file necessary to describe the hardware system using the context menu:

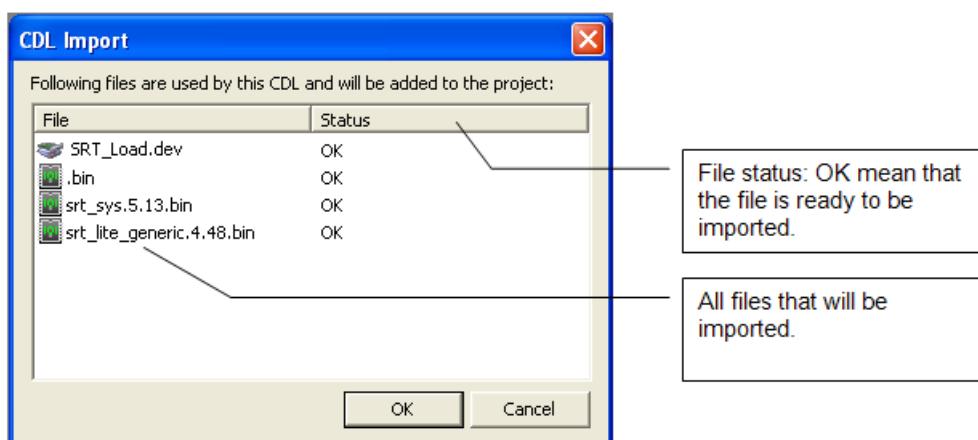


Now the CDL window can be used to edit the jobs. Further descriptions are provided in the next paragraphs.

## Import an existing firmware

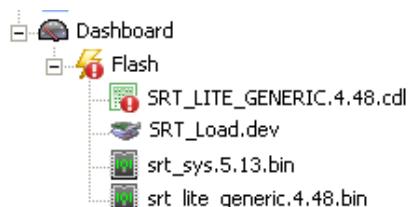
In order to import an existing firmware configuration you must use the command **Import->Code Load Command List (CDL)** and browse an existing configuration.

Now is presented the import report window:



In this report are listed all the files used by the selected CDL file and theirs relative status.

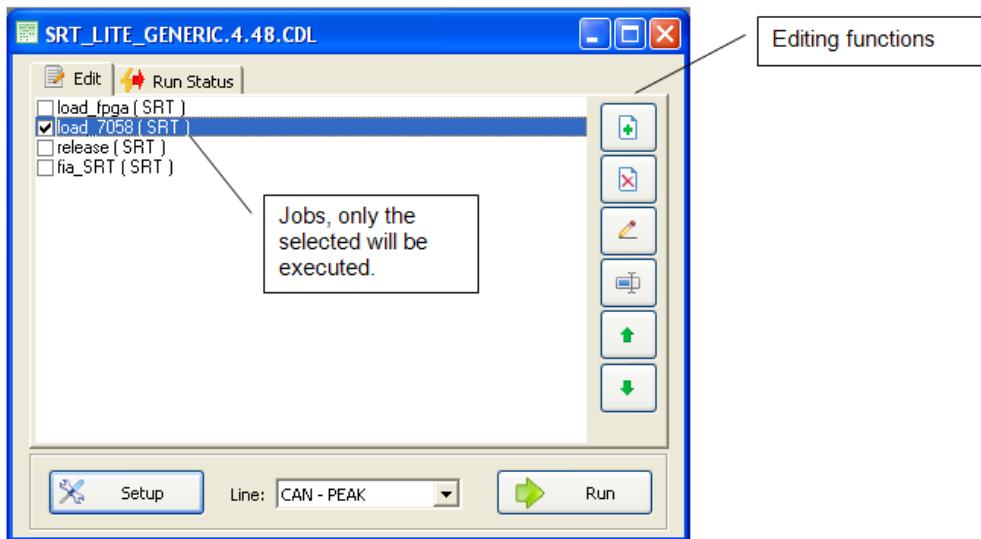
By pressing OK the firmware will be imported in the project:



An error icon on the CDL items mean that something is not OK in the configuration (for example a file to be loaded or verified was not added to the project). Placing the mouse pointer on the warning icon can show more detailed information about the error (a tooltip will be shown).

## The CDL window

The CDL window is split up in 2 panes: Edit (editing function of the jobs) and Run Status (shows the working status of a running code load).

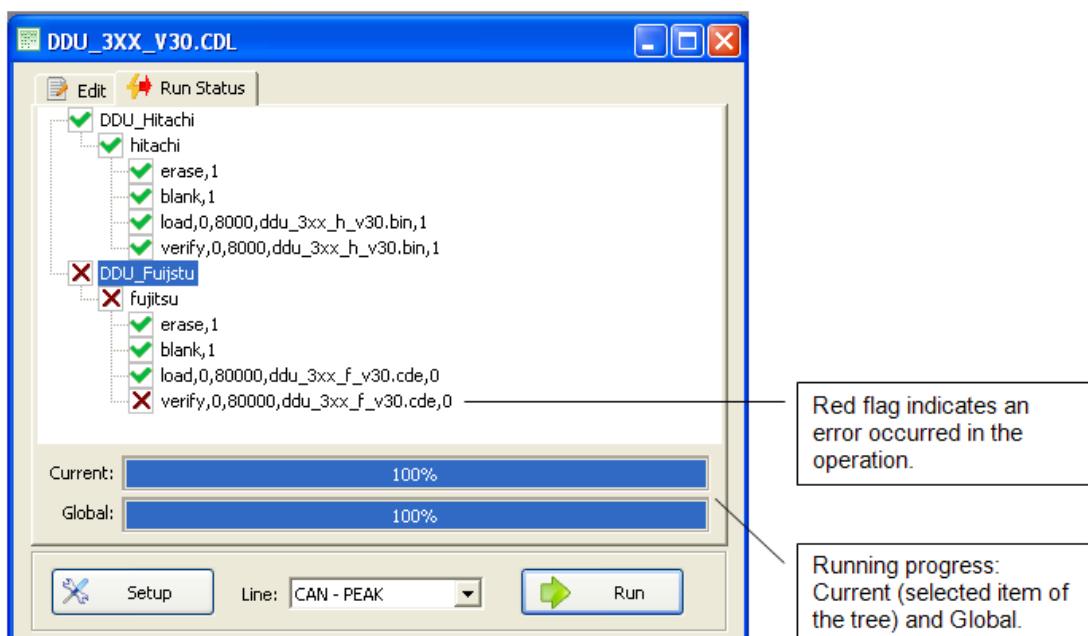


The setup button allows the configuration of the advanced communication settings. The editing options of a job are detailed described here. The combo box *Line* allows the selection of the device used for the communication with the device.

Allowed lines are:

1. Ethernet
2. CAN Peak (with USB adapter)
3. CAN MT 851

If the selected line is Ethernet a dialog is shown to allow the selection of the target device. By pressing the *Run* button the loading of the checked Jobs will start and automatically will be shown the *Run Status* tab.



By pressing the ESC button on the keyboard the operation can be aborted at every time.

During the execution of the code loading SYSMA puts messages and errors in the log window (View->Log Window) is it's opened.

Time	Message
12:36:19:523	
12:36:19:523	Thursday, December 22, 2011 - 12:36:19 Running Job ....
12:36:19:523	Verifying File ...
12:36:19:523	Verified Binary File of Job DDU_Hitachi Address hitachi : C:\SYSMA\Projects\HFD_DDU_Generic\Fir...
12:36:19:523	Verified Binary File of Job DDU_Hitachi Address hitachi : C:\SYSMA\Projects\HFD_DDU_Generic\Fir...
12:36:19:523	Verified Binary File of Job DDU_Fujitsu Address fujitsu : C:\SYSMA\Projects\HFD_DDU_Generic\Firm...
12:36:19:523	Verified Binary File of Job DDU_Fujitsu Address fujitsu : C:\SYSMA\Projects\HFD_DDU_Generic\Firm...
12:36:19:523	Job : DDU_Hitachi
12:36:20:523	CAN: PEAK selected
12:36:20:570	CAN: Open
12:36:20:633	Connect DDU_Hitachi
12:36:20:898	Reset Card Peak (Status 0x8 : Bus error: an error counter reached the 'heavy' limit. )
12:36:20:898	Please, Check Can Line Bus Termination
12:36:21:055	Reset Card Peak (Status 0x8 : Bus error: an error counter reached the 'heavy' limit. )
12:36:21:055	Please, Check Can Line Bus Termination
12:36:21:336	Reset Card Peak (Status 0x8 : Bus error: an error counter reached the 'heavy' limit. )
12:36:21:336	Please, Check Can Line Bus Termination

## Fast Code Load mode

This function allows to perform a fast code load operation with the last used settings (communication line, selected jobs and advanced settings).

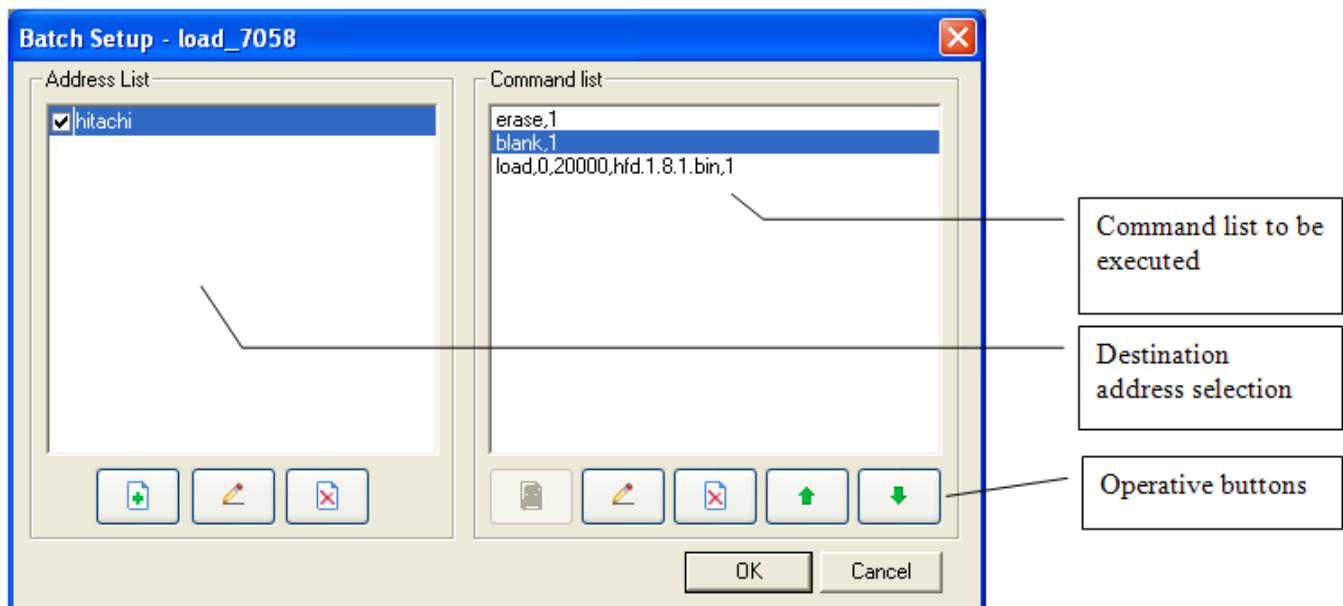
To activate the function you must use the context menu:



The CDL window will be automatically opened and the code loading operation activated. When all the operations are completed (without errors) the CDL window will be automatically closed.

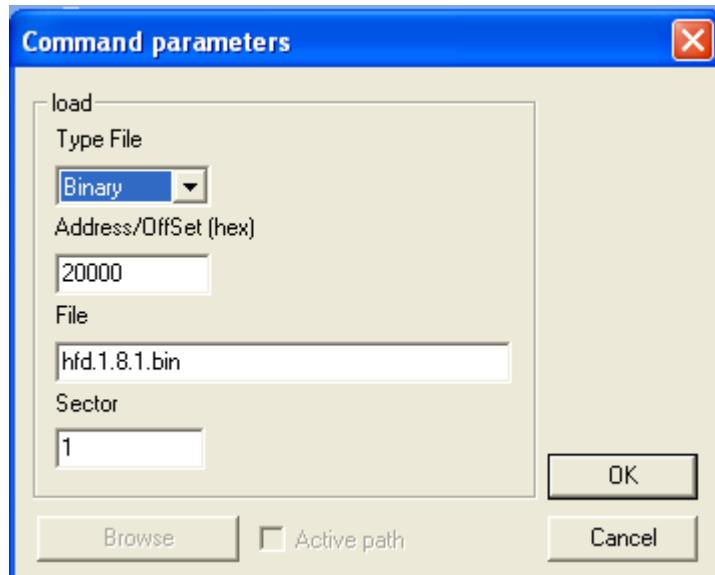
# Job Editing

By double click on a job or pressing the “Edit” button on the right of the CDL window the job-editing window is opened:



## Command Editing

Some commands available in the “Command List” need of some parameters to be set. Double clicking on the command item or pressing the edit button can configure the command task:



The next table provides a more detailed description of every command available.

## Commands

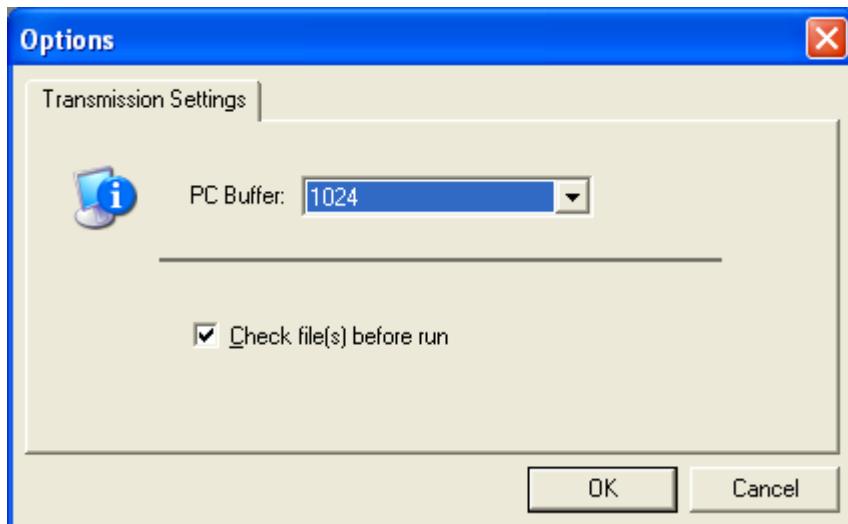
Command	Description												
Erase	<p>Erases a predefined sector.</p> <p>Required parameters:</p> <table> <tr> <td>Sector</td><td>Define the sector number (0 -255).</td></tr> </table>	Sector	Define the sector number (0 -255).										
Sector	Define the sector number (0 -255).												
Load	<p>Writes the contents of a source file on the predefined sector.</p> <p>Required parameters:</p> <table> <tr> <td>Type of file</td><td>Define the type of file: 'Binary' or 'S-Record'</td></tr> <tr> <td>Address/Offset</td><td>Define the starting address for writing (hexadecimal format): Absolute address (Binary file) or offset (S-Record).</td></tr> <tr> <td>File</td><td>Define the name of source file to write on sector.</td></tr> <tr> <td>Sector</td><td>Define the sector number (0-255).</td></tr> </table>	Type of file	Define the type of file: 'Binary' or 'S-Record'	Address/Offset	Define the starting address for writing (hexadecimal format): Absolute address (Binary file) or offset (S-Record).	File	Define the name of source file to write on sector.	Sector	Define the sector number (0-255).				
Type of file	Define the type of file: 'Binary' or 'S-Record'												
Address/Offset	Define the starting address for writing (hexadecimal format): Absolute address (Binary file) or offset (S-Record).												
File	Define the name of source file to write on sector.												
Sector	Define the sector number (0-255).												
Verify	<p>Reads the contents of a predefined sector and compares it with content of the source file.</p> <p>The parameters are the same of load command.</p>												
Read release	Reads the release information.												
Blank	<p>Verifies sector correctly erased.</p> <p>Required parameters:</p> <table> <tr> <td>Sector</td><td>Define the sector number (0 -255).</td></tr> </table>	Sector	Define the sector number (0 -255).										
Sector	Define the sector number (0 -255).												
Read	<p>Reads the memory contents of a predefined sector and saves it on the file.</p> <table> <tr> <td>Address</td><td>Define the starting address to read (hexadecimal format).</td></tr> <tr> <td>Size</td><td>Define the memory size to read (hexadecimal format).</td></tr> <tr> <td>File</td><td>Define the name of destination file.</td></tr> <tr> <td>Sector</td><td>Define the sector number (0 -255).</td></tr> <tr> <td>Output</td><td>Define the output: 'File' or 'Monitor'.</td></tr> <tr> <td>Format</td><td>Define the output format: 'Binary' or 'Hex'.</td></tr> </table>	Address	Define the starting address to read (hexadecimal format).	Size	Define the memory size to read (hexadecimal format).	File	Define the name of destination file.	Sector	Define the sector number (0 -255).	Output	Define the output: 'File' or 'Monitor'.	Format	Define the output format: 'Binary' or 'Hex'.
Address	Define the starting address to read (hexadecimal format).												
Size	Define the memory size to read (hexadecimal format).												
File	Define the name of destination file.												
Sector	Define the sector number (0 -255).												
Output	Define the output: 'File' or 'Monitor'.												
Format	Define the output format: 'Binary' or 'Hex'.												
Get_Ip	Reads the IP address of device.												
Set_Ip	<p>Writes the IP address on device.</p> <table> <tr> <td>IP Address</td><td>Define the IP address.</td></tr> <tr> <td>Subnet Mask</td><td>Define the subnet mask.</td></tr> <tr> <td>Set last IP</td><td>If it is checked writes the last IP address: normally the last IP address is read via Get_Ip command.</td></tr> </table>	IP Address	Define the IP address.	Subnet Mask	Define the subnet mask.	Set last IP	If it is checked writes the last IP address: normally the last IP address is read via Get_Ip command.						
IP Address	Define the IP address.												
Subnet Mask	Define the subnet mask.												
Set last IP	If it is checked writes the last IP address: normally the last IP address is read via Get_Ip command.												

# Advanced Configurations

You can configure the following parameters:

1. - PC Buffer
2. - Check File(s) before run

To change this parameters select *Code Load/ Code Load Options* or press the button "Setup" in the CDL window.



**PC Buffer:** Defines the size of pc buffer.

**Check File(s) before run:** SYSMA Code Loader can be configured so that it carries out the syntax check of the files to be loaded before the *Run* cycle. This check allows you to avoid any cycle interruptions due to syntax errors or the lack of files.

## Appendix 1 – CAN Peak Status

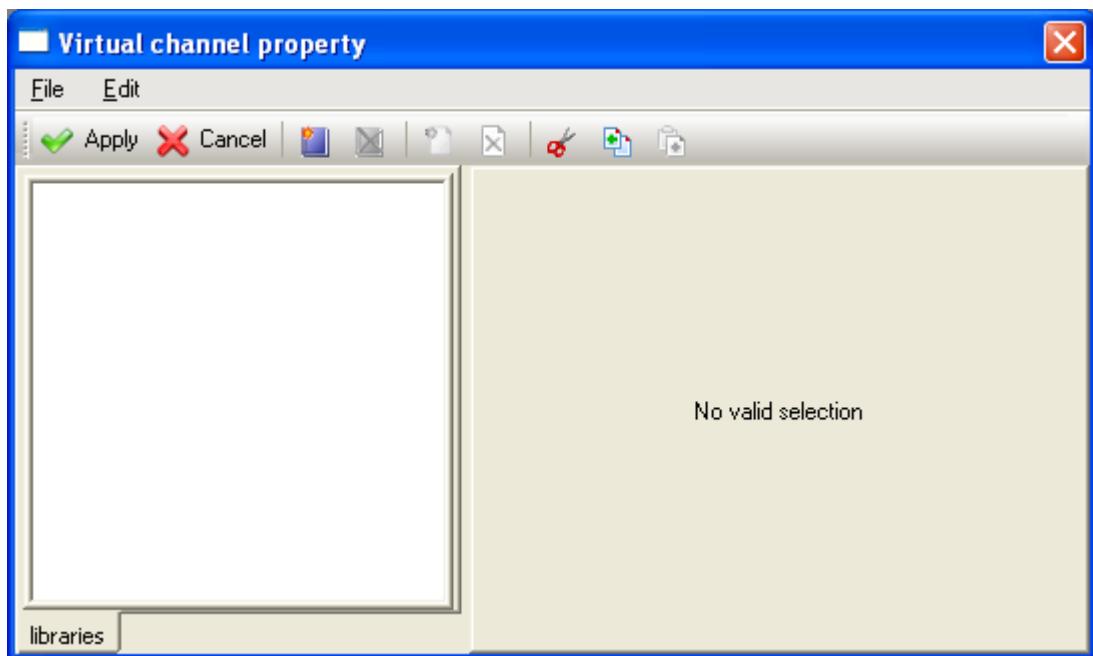
Value	Meaning
0000h	No error.
0001h	Transmission buffer of the controller is full.
0002h	CAN controller has been read out too late.
0004h	Bus error: An error counter has reached the 'Light' limit.
0008h	Bus error: An error counter has reached the 'Heavy' limit.
<b>Troubleshooting: Check Can Bus Line Termination</b>	
0010h	Bus error: Actual state from the CAN controller is 'Bus Off'.
0020h	Receive queue is empty.
0040h	Receive queue has been read out too late.
0080h	Transmission queue is full.
0100h	Register test of the 82C200/SJA1000 has failed.
0200h	Driver is not loaded.

0800h	At least one client is connected to the net.
1400h	Hardware handle is invalid.
1800h	Net handle is invalid.
1C00h	Client handle is invalid.
1C00h	Mask for all handle errors.
2000h	Resource (FIFO, client, timeout) cannot be created.
4000h	Parameter is not permitted/applicable here.
8000h	Parameter value is invalid.

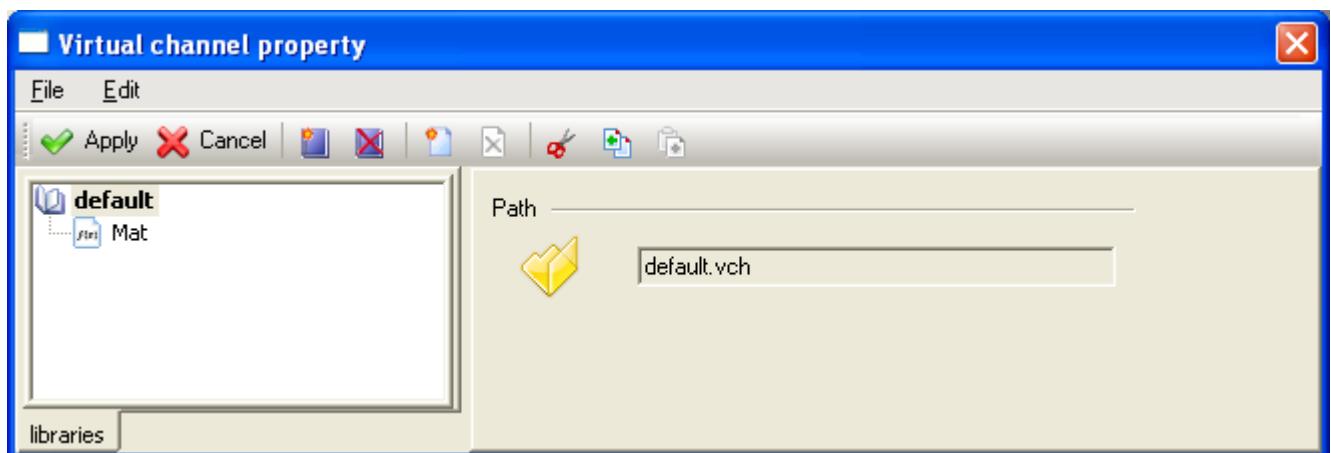
# Virtual Channel

## Virtual channel property window

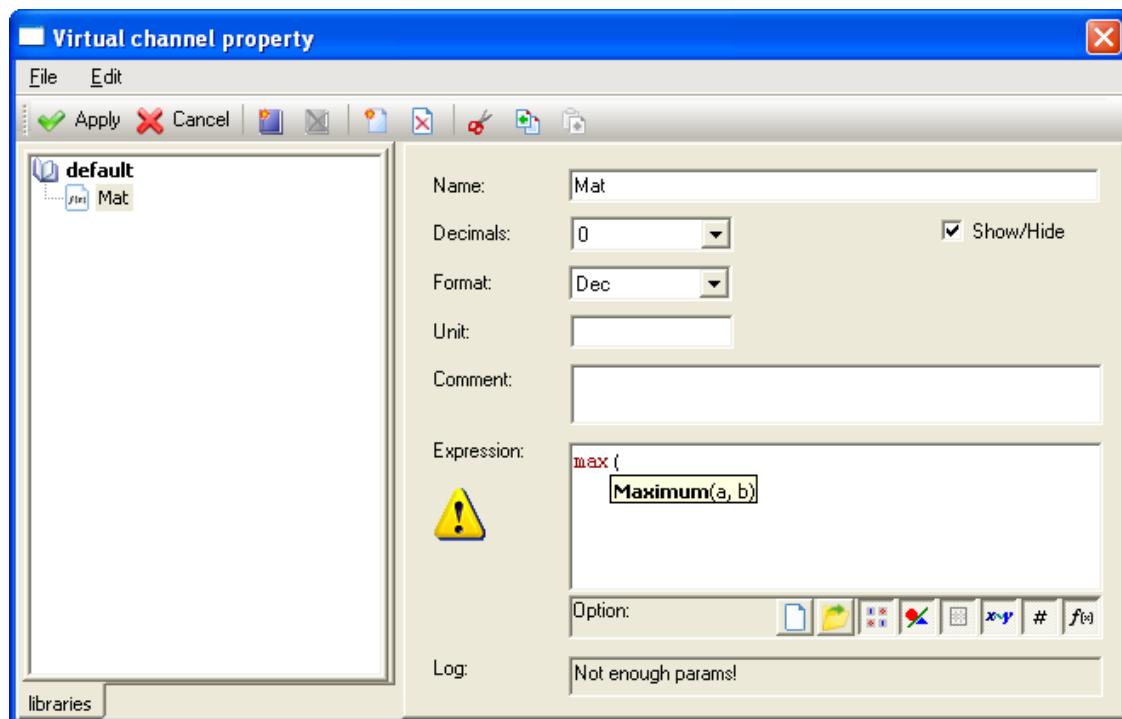
This window shows virtual channels resulting of some user-defined functions applied to normal acquired channels. Select *Tools/Virtual Channel* to open the editor.



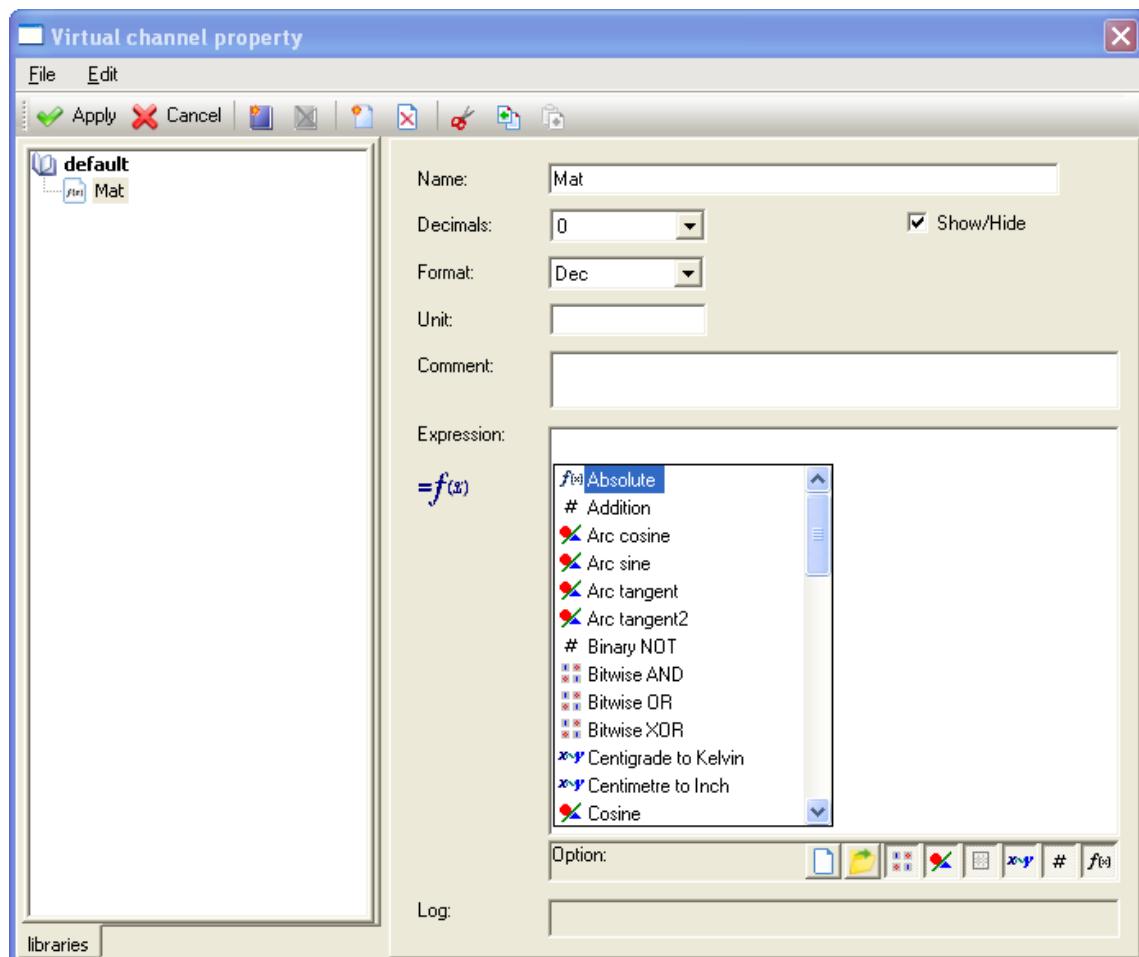
Select *File/load library* from the editor menu in this window or click on the icon and load or create one or more VCH files. The libraries that are currently loaded are listed on the left of the editor window. The path for the highlighted library is shown on the right. Use the read only flag to prevent entries in the library from being modified.



To remove a library from the list simply select *File/Unload library* or click on icon. To create virtual channels select *Edit/Add Channel* or click on the icon .



A new entry with a default name will be created and the editor will show the fields needed to define the math expressions. Click inside the Expression pane and begin typing. Note that you do not have to type an equals sign at the start of the expression. As you type an expression the editor will prompt for function arguments when you type an open bracket.



**Name:** the name associated to the virtual channel.

**Show/Hide:** enables or disables visualization of the channel in the *Channel Browser*.

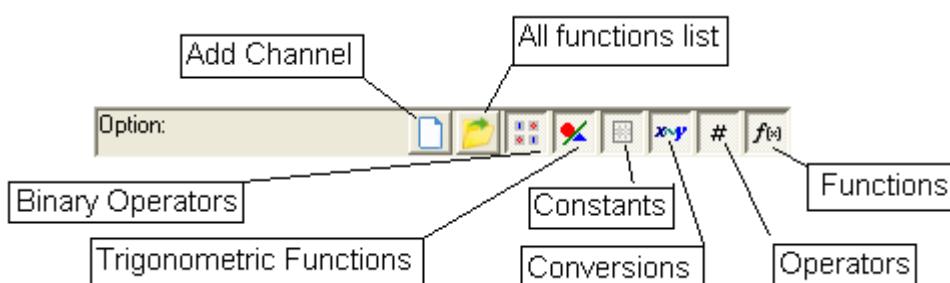
**Decimals:** number of decimals for values of the virtual channel.

**Format:** display output format (decimal or hexadecimal).

**Unit:** string for measure unit.

**Comment:** comment associated to the virtual channel.

**Expression:** formula expression to calculate virtual channel values.



To see a list of available functions and operators click on the button  in the Option field and select from the drop down list. The functions and the operators that you find in this list can be chosen selecting the relative icons.

Use the *Show/Hide* flag to define whether an expression is to be displayed in the SYSMA Channel Browser (you may want to hide intermediate expressions).

## Functions included

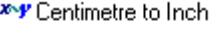
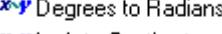
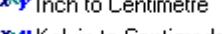
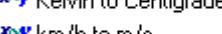
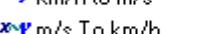
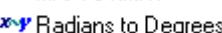
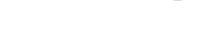
### Operators

 Bitwise AND
 Bitwise OR
 Bitwise XOR
 If Equal
 If Greater or Equal
 If Greater Than
 If Less or Equal
 If Less Than
 If Not Equal
# Addition
# Binary NOT
# Division
# Exponent
# Multiplication
# Subtraction

### Functions

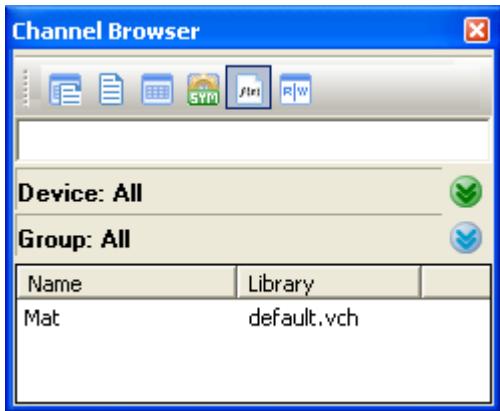
 Arc cosine	 Absolute
 Arc sine	 Exponential
 Arc tangent	 IIR_HP
 Arc tangent2	 IIR_LP
 Cosine	 Logarithm base 10
 Hyperbolic cosine	 Maximum
 Hyperbolic sine	 Minimum
 Hypotenuse	 Natural logarithm
 Sine	 Remainder
 Tangent	 Square Root

### Constants and Conversions

 e constant	 Centigrade to Kelvin
 Gravitational acceleration	 Centimetre to Inch
 NorX constant	 Degrees to Radians
 Pi	 Inch to Centimetre
	 Kelvin to Centigrade
	 km/h to m/s
	 m/s To km/h
	 Radians to Degrees

## Displaying math channels

Math channels are displayed in the SYSMA *Channel Browser*, selecting the  filter button.



# Tools

Commands in main menu *Tool* complete and integrate features and functions for SYSMA: running external application, comparing Databases, checking compliance between Logging Channels tables and CLX for ensure proper use of devices, customizing short-cuts accelerators.

- Run
- Compare CLX
- Compare TPX
- Check CLX - TPX
- Customize Accelerators

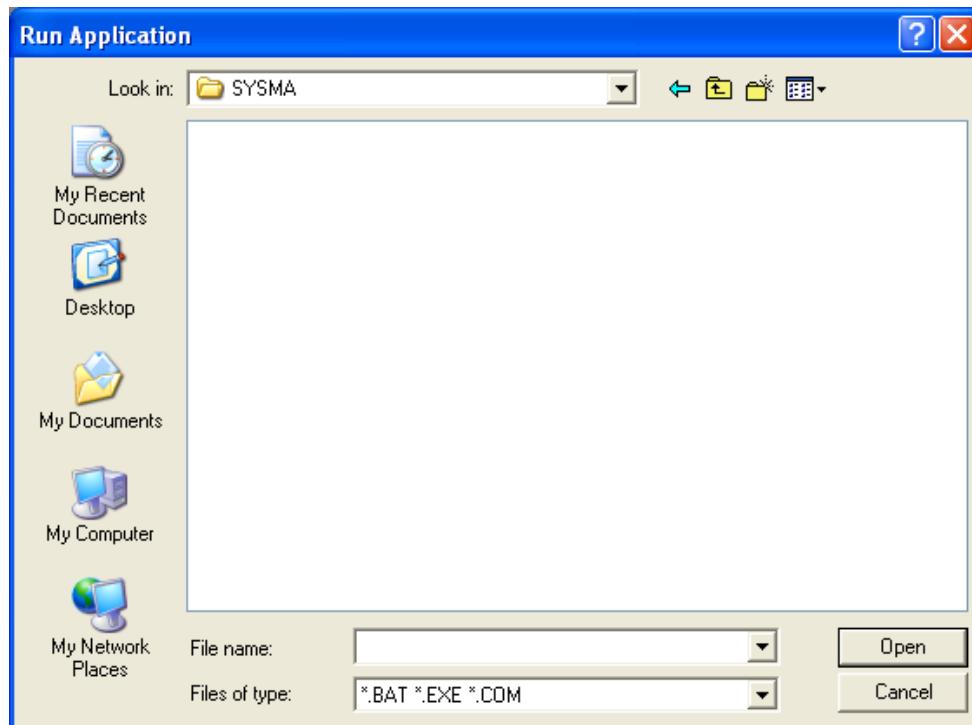
## Run

SYSMA allows running several external tools and applications, for further analysis features. Select commands *Generic Application...* and *Excel* from *Tools* main menu.

### Generic Application...

This command opens a standard *Windows ®* browser interface for selecting a file for the application or batch function to run. Allowed file types are:

- .BAT,
- .EXE,
- .COM.



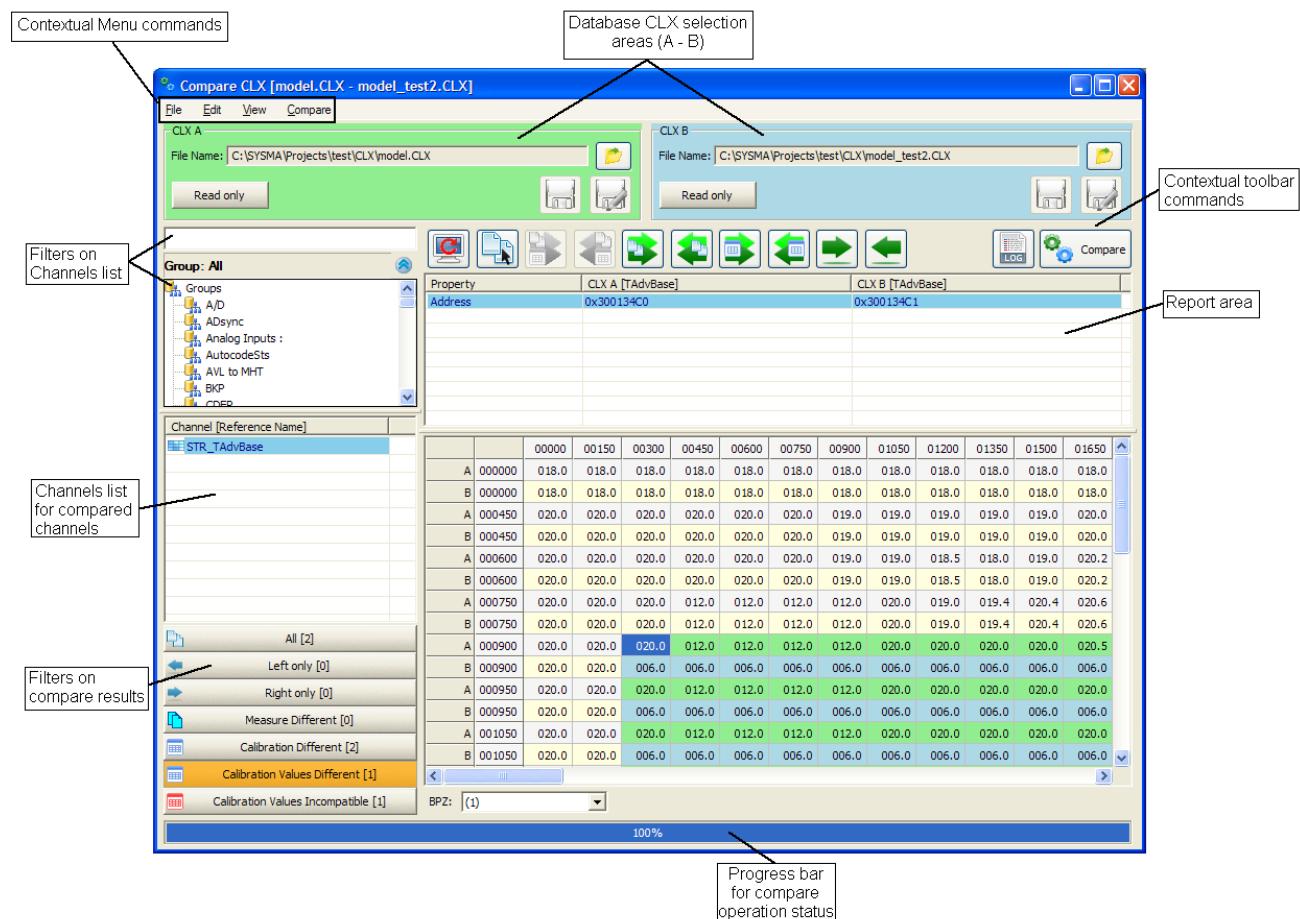
## Excel

This command opens a session for the *Microsoft Excel* ® application version installed on the machine. Once *Excel* ® application is activated, it's possible to use its standard functions together with SYSMA tools:

- copy data values from SYSMA analysis windows and paste them to Excel worksheets using the clipboard,
- run Excel macros,

## Compare CLX

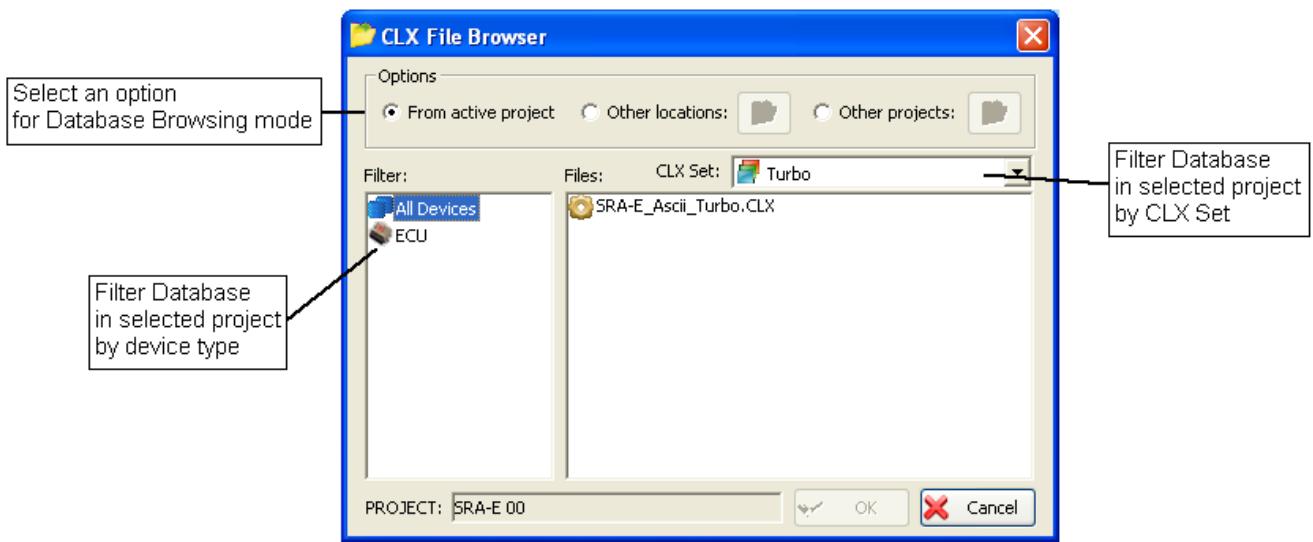
*Compare CLX* environment allows comparing channels configured in two Database CLX files, for detecting differences in channels definition (e.g. settings for elaboration, acquisition line definition and so on) or channels values. Once comparison operation is done, user can analyze differences and choose desired alignment strategy, then update Database CLX files and save them to disk. The *Compare CLX* window can be opened from *Compare CLX...* command in *Tools* main menu. *Compare CLX* window is divided into different areas: contextual menu for comparison commands, Database CLX selection, contextual toolbar commands with icons correspondent to contextual menu, compared *Channels list* with filtering items, Report area for comparison results and details, progress bar for monitoring comparison status.



In order to distinguish Database CLX file A from B, different colours are used in background of CLX selection areas, column items in Report areas and other interface elements for comparison environment.

## Selecting Database CLX

The first step for performing comparison operation is to select Database CLX files A and B. It's possible to use browse button icons or commands in *File* contextual menu (*Browse CLX A...*, *Browse CLX B...*).



In the *CLX File Browser* window that appears, user can choose different options for searching Database files:

- *From active project*, all CLX files loaded for active project will be selected;
- *Other locations* allows to choose files using standard Windows interface (select browse button to open the window);
- *Other projects* displays all CLX files configured for a different project (select browse button to open *Open Project* window for selecting a project file).

If user selects to search Database CLX in a project (the active one or another), further filtering functions are available, depending on devices (in *Filter* list choose a device type) and CLX Set configured for the project (using the combo box above *Files* list). The project name will be displayed in *PROJECT* field in the bottom area.

*Read only* buttons in Selection area for Database CLX files A or B prevent unwanted modifications to CLX Databases: if *Read only* status is selected (button is green), the command buttons for copy and edit operations are disabled.

## Execute Compare

Click on *Compare* button in contextual toolbar or *Compare / Run compare...* in contextual menu to start comparison of the selected Database CLX files. The progress bar in the bottom area will show the percentage status of the operation.

Results of the comparison are displayed both in *Channel list* on the left and in the *Report area*.

Select a single item in the list to analyze in Report area details about channel comparison.

Compare differences are also grouped by categories. An aggregate summary for categories of differences detected can be read in buttons below *Channel list*. Each button shows the category of difference and the number of channels dealing with category type (in square brackets).

Category for compare difference	Icon	Description
All		All channels that have a difference of any type
Left only		Channels that are configured only in Database CLX A
Right only		Channels that are configured only in Database CLX B
Measure Different		Measurement channels that differ for at least one property definition (e.g.: Acquisition Line, Address ...)
Calibration Different		Calibration channels that differ for at least one property definition (e.g.: Box Unit, Conversion coefficients ...)
Calibration Different Values		Calibration channels that differ for at least one value (only differences in values are considered)
Calibration Incompatible Values		<p>Calibration channels that have at least one difference from this special sub set:</p> <ul style="list-style-type: none"> <li>• hide table;</li> <li>• disable table;</li> <li>• different box-unit</li> <li>• different sizes (X, Y, Z values);</li> <li>• different <i>format</i> (BYTE, WORD...);</li> <li>• different enum sizes (only enum calibration);</li> <li>• different conversion ABCDK;</li> <li>• different output format (DEC, HEX ...);</li> <li>• different <i>Breakpoints</i>.</li> </ul> <p>(see Calibration Properties in ECU chapter for details about these settings).</p>

Channel list can be filtered for searching specific channels by:

- Name, edit string for the desired name in the field on the left;
- Group, select a Group defined in compared Database CLX;
- Type of difference, use buttons under *Channel list*.

Compare differences can then be resolved, aligning whole Database CLX files, or updating specific settings or values for selected channels, and choosing a direction (from CLX A to B or from B to A). Use commands in *Compare* menu or buttons in contextual toolbar.

# Editing values of compared calibrations

For calibration channels, user can manually modify values, opening specific windows with commands in menu Edit.

These dedicated windows are particularly useful, because user is able to edit calibration values, comparing the two calibrations meanwhile. User can choose among three different layouts, as for calibration ECU windows: Table, 2D, 3D. For each layout further modes are available as illustrated in following pictures.

## Table – side by side

Tables [Advance_During_Start_Bangbang_f_rpm_p2_ - Advance_During_Start_Bangbang_f_rpm_p2_]								
<input type="checkbox"/> Alternate rows...								
BPZ	(1)	3500	4000	4500	5000	5500	6000	
1,1,1	3000	3500	4000	4500	5000	5500	6000	
01.0	020.0	020.0	018.0	020.0	010.0	010.0	008.0	
01.5	020.0	020.0	016.0	016.0	016.0	015.0	008.0	
02.0	015.0	015.0	016.0	016.0	012.0	009.0	009.0	
02.5	012.0	012.0	014.0	014.0	015.0	009.0	009.0	
03.0	010.0	010.0	010.0	012.0	009.0	009.0	009.0	

Tables [Advance_During_Start_Bangbang_f_rpm_p2_ - Advance_During_Start_Bangbang_f_rpm_p2_]								
<input type="checkbox"/> Alternate rows...								
BPZ	(1)	3500	4000	4500	5000	5500	6000	
1,1,1	3000	3500	4000	4500	5000	5500	6000	
01.0	017.0	017.0	018.0	020.0	010.0	010.0	008.0	
01.5	015.0	015.0	016.0	016.0	016.0	015.0	008.0	
02.0	015.0	015.0	016.0	016.0	016.0	012.0	009.0	
02.5	012.0	012.0	014.0	014.0	014.0	015.0	009.0	
03.0	010.0	010.0	010.0	012.0	009.0	009.0	009.0	

Values for calibration tables from Database CLX A and B are displayed in numerical format side by side. CLX A and B are identified with a different border colour. Also cells with differences are highlighted using a dedicated colour. User can edit values directly in table cells.

A button in the header area allows switching to a different numeric layout (*Alternate rows...*).

## Table – Alternate rows

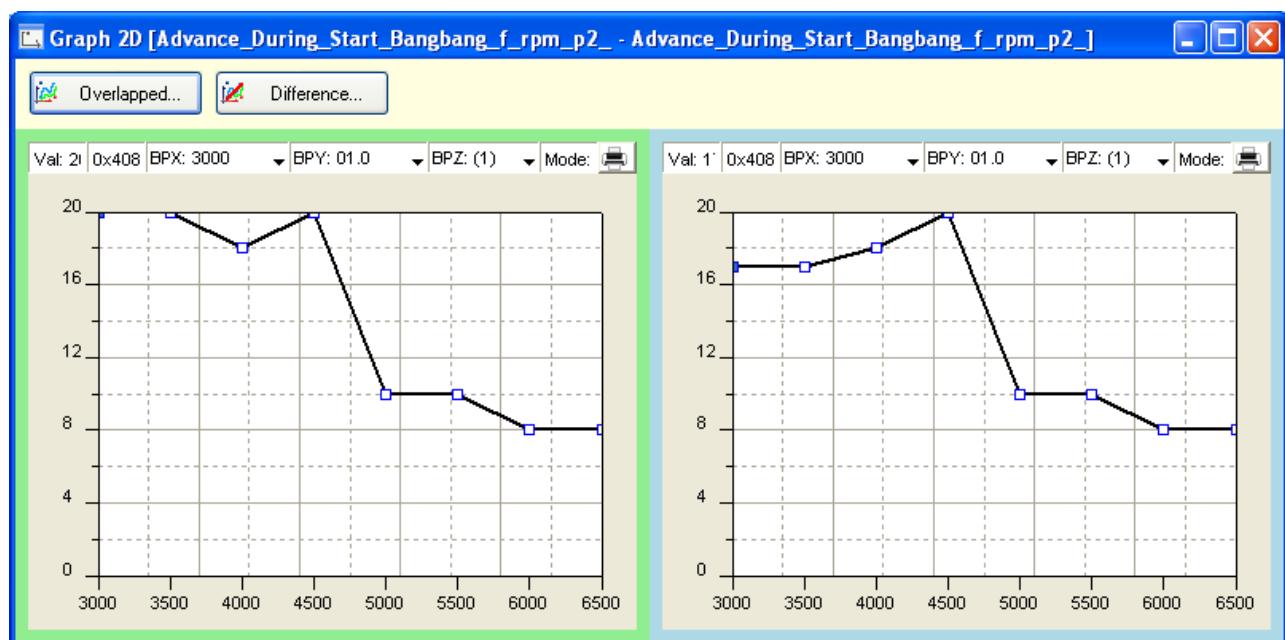
Tables [Advance\_During\_Start\_Bangbang\_f\_rpm\_p2\_ - Advance\_During\_Start\_Bangbang\_f\_rpm\_p2\_]

Side by side...

BPZ	(1)							
1,1,1	3000	3500	4000	4500	5000	5500	6000	6500
01.0	020.0	020.0	018.0	020.0	010.0	010.0	008.0	008.0
01.0	017.0	017.0	018.0	020.0	010.0	010.0	008.0	008.0
01.5	020.0	020.0	016.0	016.0	016.0	015.0	008.0	008.0
01.5	015.0	015.0	016.0	016.0	016.0	015.0	008.0	008.0
02.0	015.0	015.0	016.0	016.0	012.0	009.0	009.0	009.0
02.0	015.0	015.0	016.0	016.0	012.0	009.0	009.0	009.0
02.5	012.0	012.0	014.0	014.0	015.0	009.0	009.0	009.0
02.5	012.0	012.0	014.0	014.0	015.0	009.0	009.0	009.0
03.0	010.0	010.0	010.0	012.0	009.0	009.0	009.0	009.0
03.0	010.0	010.0	010.0	012.0	009.0	009.0	009.0	009.0

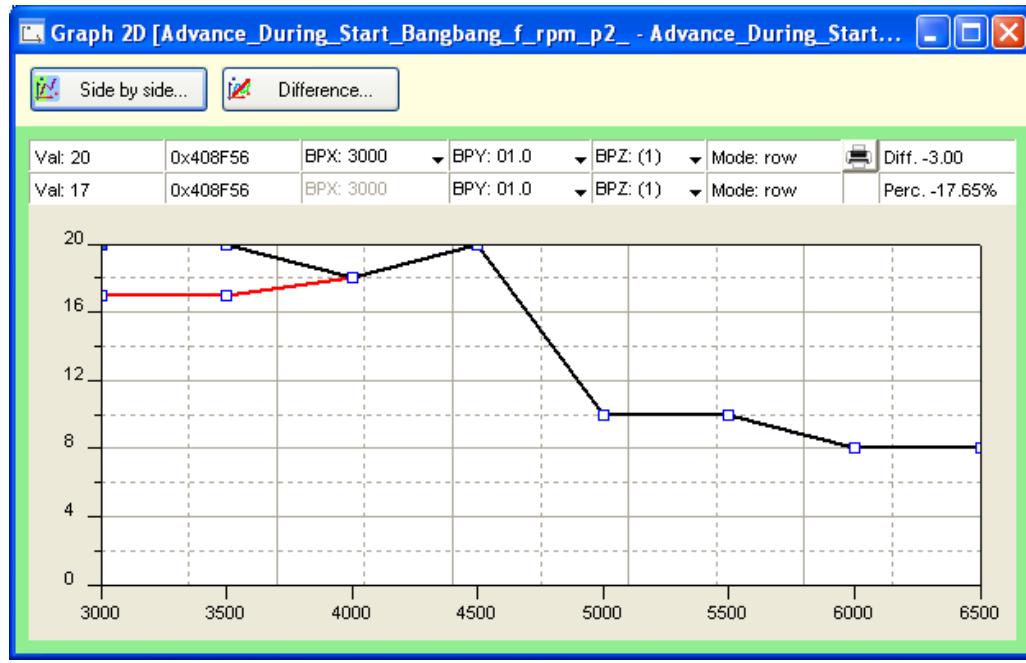
In the same table window, values for calibration of Database CLX A and B are displayed. Rows are alternated: a row of values for calibration in CLX A is followed by the row of values for calibration in CLX B (at the same breakpoint). Cells with different values are highlighted with colours that also identify each CLX. The button in the header area allows switching to a different numeric layout (*Side by side...*).

## 2D Graph - side by side



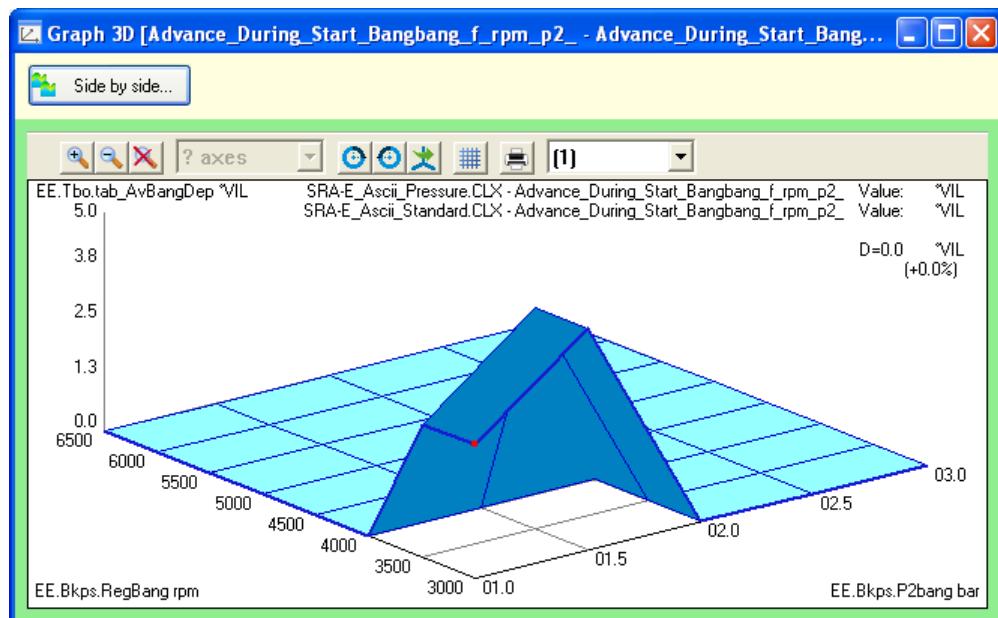
Series of values for a selected row (or column) of calibration in CLX A and CLX B are plotted in two 2D graphs, one next to the other. Different border colours associate each 2D graph to the proper CLX. User can access to standard functions for 2D graph: select a different row or column, modify values with mouse or keyboard, change the Z layout, and print the window. In header area, two buttons allow to switch to other 2D layouts.

## 2D Graph – overlapped



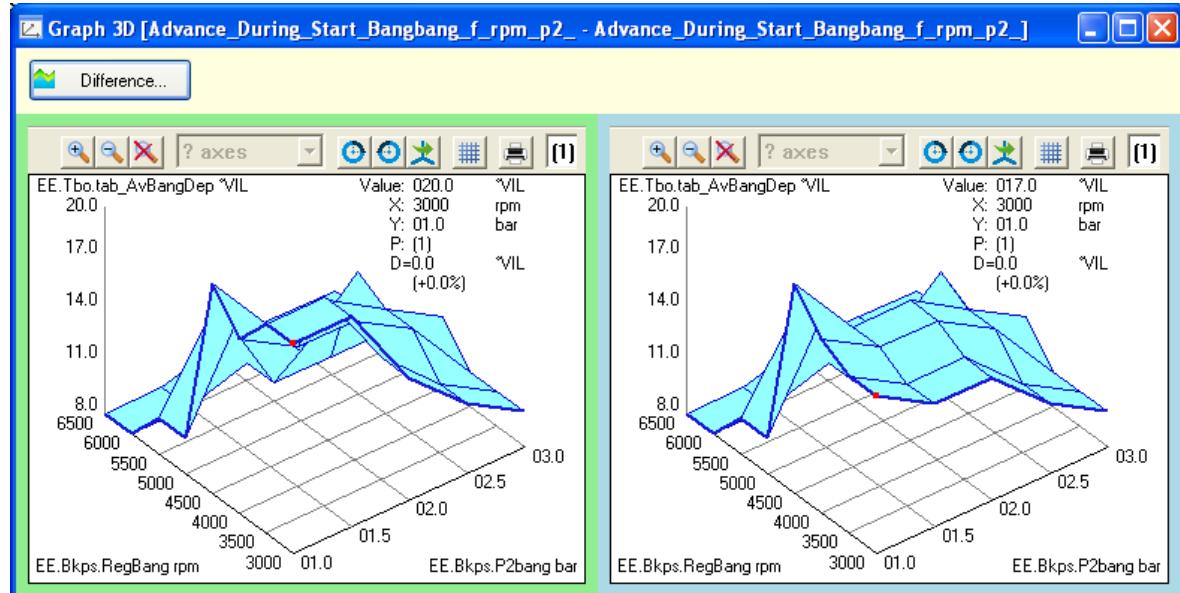
This window shows in the same 2D graph the series of values for calibration in CLX A and CLX B, for a selected row (or column). Different colours are used for line graphs for CLX A and CLX B. In header area, two buttons allow to switch to other 2D layouts.

## 2D Graph – difference



This window shows the 2D graph of differences between values of a row (or a column) for calibration in CLX A and calibration in CLX B. In header area, two buttons allow to switch to other 2D layouts.

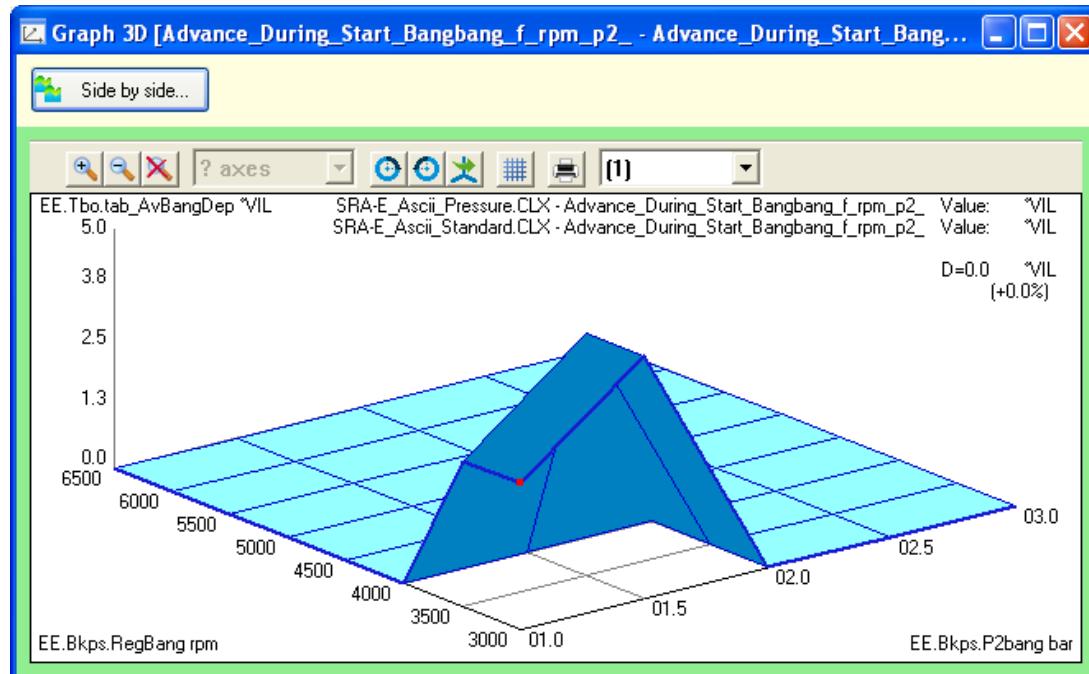
### 3D Graph - side by side



This window shows 3D graphs for values of calibration in CLX A and CLX B one next to the other. Different border colours associate each graph to correspondent Database CLX. Standard functions for manipulate 3D graph for calibration tables are available.

Button in header area allows to switch to *Difference...* layout for 3D graph.

### 3D Graph – difference



This 3D window displays the graph of differences calculated between values of calibration in CLX A and values of calibration in CLX B.

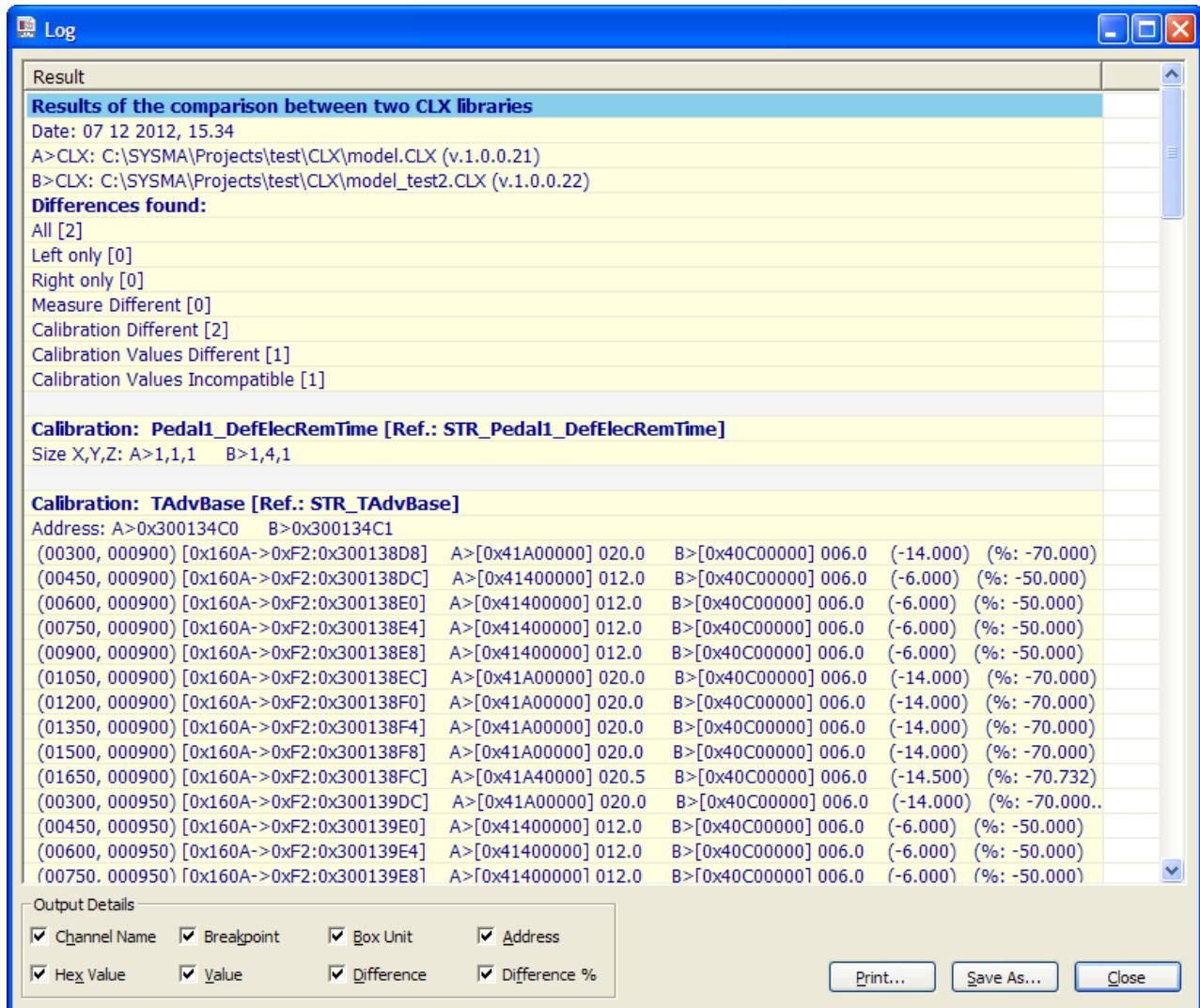
The button in the header area allows switching to *Side by side...* layout for 3D graph.

User can also edit calibration values with table, 2D or 3D layouts for a single channel (calibration from CLX A or from CLX B).

Differences in calibration values are also displayed in the Report area, when a single calibration channel is selected in *Channels list*. Values are organized in alternate rows (one from calibration in CLX A and one from CLX B), using colours proper to each Database CLX in cells with different values. *BPX* combo box allows selecting available Z layouts for calibration channel.

The screenshot shows the 'Compare CLX' application window. At the top, there are two sections for 'CLX A' and 'CLX B', each with a 'File Name' field set to 'C:\SYSMA\Projects\test\CLX\model.CTX'. Below each section is a 'Read only' button. The 'CLX A' section has a tree view under 'Group: All' containing categories like Groups, A/D, ADsync, Analog Inputs, AutocodeSts, AVL to MHT, BKP, and CDRP. The 'CLX B' section has similar controls and a tree view. In the center, there's a toolbar with icons for file operations and a 'Compare' button. Below the toolbar is a table comparing memory addresses from 'CLX A [TAdvBase]' and 'CLX B [TAdvBase]'. The table shows data for addresses 0x300134C0 and 0x300134C1. The data is presented in a grid format with columns for address and values for addresses 00000, 00150, 00300, 00450, 00600, 00750, 00900, 01050, 01200, 01350, 01500, and 01650. The values are color-coded in green, yellow, and blue. At the bottom left, there's a 'Channel [Reference Name]' list with 'STR\_TAdvBase' selected. On the right, there's a 'BPZ' dropdown set to '(1)' and a status bar showing '100%'. The bottom navigation bar includes icons for back, forward, and search.

# Log Window



After running the compare operation, the user can view the results in text format.

The results of the compared channels are listed with the name and the different properties.

The user can filter the output results using the filters.

The user can print and save text files of the displayed results.

# Contextual menus and commands

Commands and functions to manage *Compare CLX* environment are available in contextual menu, integrated in the window, and in popup menu that opens with a right button mouse click on items in *Channel list*.

## File

In menu *File* you can find commands for managing Database CLX files selected for compare: browse files from disk, save modifications to disk, set Read Only status.

Command	Icon	Description
Browse CLX A...		Opens interface for selecting Database CLX file A
Browse CLX B...		Opens interface for selecting Database CLX file B
Save CLX A		Commands for saving Database CLX file A
Save		Saves the selected Database CLX file A to disk
Save As...		Saves the selected Database CLX file B to disk with a different name
Save CLX B		Commands for saving Database CLX file B
Save		Saves the selected Database CLX file B to disk
Save As...		Saves the selected Database CLX file B to disk with a different name
CLX A read only		Sets the Read Only status for Database CLX file A
CLX B read only		Sets the Read Only status for Database CLX file B
Exit		Closes <i>Compare CLX</i> window

## Edit

In menu *Edit* you can find commands for managing advanced compare operations for calibration channels.

Command	Icon	Description
Table		Commands for managing comparison operations for calibration channels values
Edit tables side by side...		Opens an interface window for editing compared calibration values side by side

<b>Edit tables alternate rows...</b>		Opens an interface window for editing compared calibration values with alternate rows
<b>Edit table A...</b>		Opens an interface window for editing calibration channel values in Database CLX A
<b>Edit table B...</b>		Opens an interface window for editing calibration channel values in Database CLX B
<b>2D Graph</b>		Commands for editing compared calibrations using 2D graph
<b>Edit 2D graph side by side...</b>		Opens 2D graph for editing calibrations side by side
<b>Edit 2D graph overlapped...</b>		Opens 2D graph for editing calibrations overlapped
<b>Edit 2D graph difference...</b>		Opens 2D graph for editing calibrations differences
<b>Edit 2D graph A...</b>		Opens 2D graph for editing calibrations in Database CLX A
<b>Edit 2D graph B...</b>		Opens 2D graph for editing calibrations in Database CLX B
<b>3D Graph</b>		Commands for editing compared calibrations using 3D graph
<b>Edit 3D graph side by side...</b>		Opens 3D graph for editing calibrations side by side
<b>Edit 3D graph difference...</b>		Opens 3D graph for editing calibrations differences
<b>Edit 3D graph A...</b>		Opens 2D graph for editing calibrations in Database CLX A
<b>Edit 3D graph B...</b>		Opens 2D graph for editing calibrations in Database CLX B
<b>Select all channels</b>		Select all channels in channel list

## View

Only one command is present in *View* menu: it switches between Display and Reference Name in Channels list, to help searching channels. The text in Channel list header will show which mode is current.

Command	Icon	Description
<b>View channels by Display Name / Reference Name</b>		Alternates Display Name and Reference Name for showing channels in Channels list
<b>View Log</b>		Show Log Window with compare result

## Compare

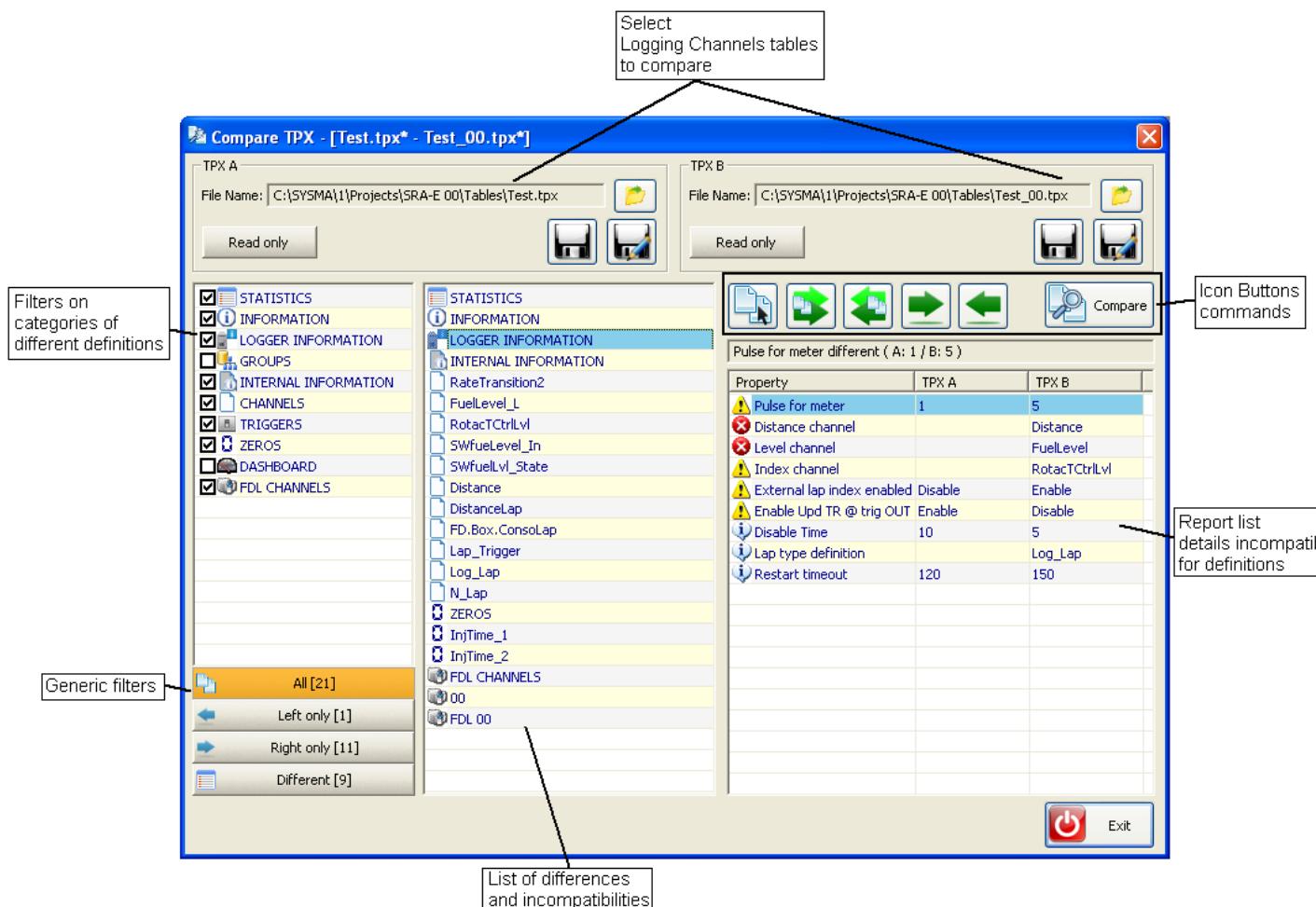
*Compare* menu collects commands for execute compare and update or align Database CLX selected.

Command	Icon	Description
<b>Run Compare</b>		Executes comparison between selected Database CLX files
<b>Copy all definitions and all values to right</b>		Updates Database CLX B with properties and values of Database CLX A
<b>Copy all definitions and all values to left</b>		Updates Database CLX A with properties and values of Database CLX B
<b>Copy all definitions to right</b>		Updates Database CLX B with properties of Database CLX A
<b>Copy all definitions to left</b>		Updates Database CLX A with properties of Database CLX B
<b>Copy all values to right</b>		Updates Database CLX B with values of Database CLX A
<b>Copy all values to left</b>		Updates Database CLX A with values of Database CLX B
<b>Copy selected definitions to right</b>		Updates selected property for selected channel in Database CLX A with property for correspondent channel in Database CLX B
<b>Copy selected definitions to left</b>		Updates selected property for selected channel in Database CLX B with property for correspondent channel in Database CLX A

Another way to quickly run Database CLX comparison is by *Compare CLX To* and *Compare CLX...* commands in popup menu that opens with right mouse button click on CLX items in *Projects Workspace* window. *Compare CLX...* simply opens *Compare CLX* window as done with command in *Tool* menu. *Compare CLX To* allows to execute the operation in two steps, using Database items shown in *Projects Workspace* window: first click with right mouse button on the Database CLX item you want to be CLX A and select *Compare CLX To*. Then click with right mouse button on the Database CLX item you want to be CLX B and select *Compare CLX....*

## Compare TPX

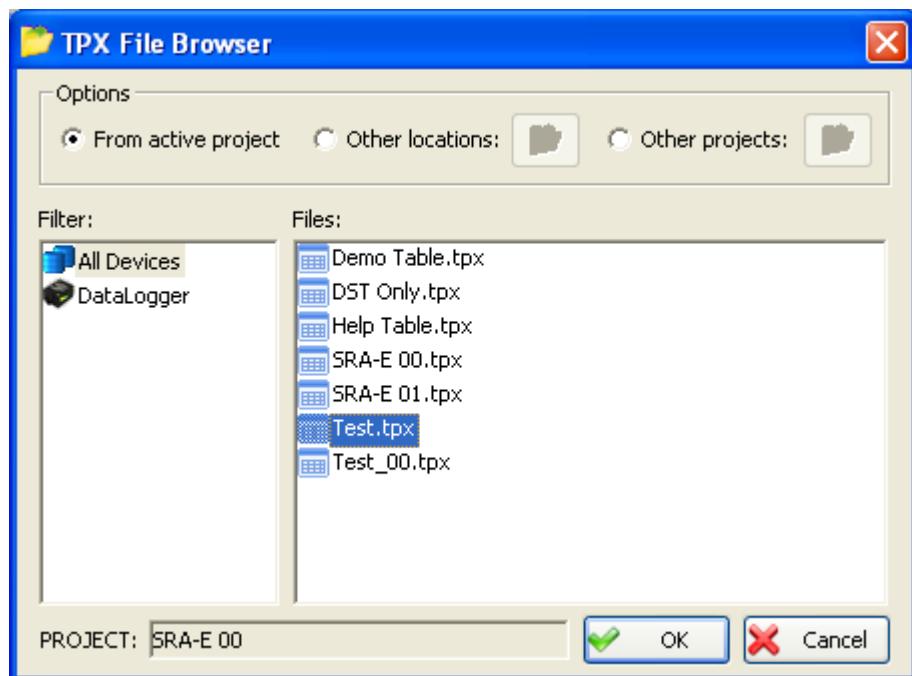
*Compare TPX* command searches for differences between two *Logging Channels* tables (.TPX files). The result of comparison operation is displayed in *Compare TPX* window, where individual differences are classified by category and level. User can choose which differences to correct by copying settings from one *Logging Channels* table to the other. Select *Tools / Compare TPX...* from main menu, or right click with mouse on a configured *Logging Channels* table item in *Projects Workspace* window (.TPX file) then run *Compare TPX...* from the popup menu. In second case, the *Logging Channels* table selected in *Projects Workspace* window will automatically be TPX A.



Compare TPX window is divided into different areas: Header area for selecting items to compare; contextual toolbar commands with icon buttons, for executing compare, changing report visualization and align compared items; list of differences with filtering items; report area for comparison results and details.

## Select items to compare

The first step for performing comparison operation is to select *Logging Channels* table files A and B. Use browse button icons  in each selection area (sections *TPX A* and *TPX B*).



In the *TPX File Browser* window that appears, user can choose different options for searching *Logging Channels* table files:

- *From active project*, all TPX files loaded from active project will be displayed for selection;
- *Other locations*, allows to choose files using standard Windows interface (select browse button to open the window);
- *Other projects*, displays all TPX files configured from a different project (select browse button to open *Open Project* window for selecting a project file).

If user selects to search *Logging Channels* table in a project (the active one or another), he also will be able to filter *Logging Channels* table files configured only in data logger device, or all *Logging Channels* table configured in the project. The name for the referenced project will be displayed in PROJECT field in the bottom area.

*Read only* buttons in Selection areas for TPX files A or B prevent unwanted modifications to *Logging Channels* table configurations: if *Read only* status is selected (button is green), the command buttons for copy and edit operations are disabled.

## Compare TPX and filter results

Once TPX files are selected, click on <image> Compare button in contextual toolbar. Items listing differences and report area will be filled up. Filtering items on the left are organized in a list of specific categories of differences and buttons for differences of generic type. The following table summarize categories for differences, each one dealing with a specific aspect for *Logging Channels* table configuration.

Category for compare difference	Icon	Description
STATISTICS		Differences in aggregate statistics for the table (e.g.: total number of channels configured)
INFORMATION		Differences in settings relative to Table Properties
LOGGER INFORMATION		Differences in settings for managing the logger
GROUPS		Differences in Groups settings (e.g.: Groups not present in a table, or Groups that include different channels)
INTERNAL INFORMATION		Differences relative to internal settings for <i>Logging Channels</i> table (e.g.: the name of associated device)
CHANNELS		Differences in list of channels configured in tables or differences dealing with settings for each channel.
TRIGGERS		Differences in the configuration of Trigger conditions
ZEROS		Differences in the configuration for managing Zeros
DASHBOARD		Differences in the configuration of the dashboard associated to the data logger
FDL CHANNELS		Differences in the configuration for Fast Data Logging function

Select the check item on the left of each specific category in order to update the list of differences on the right. Filtering buttons for generic differences also report the number of measurements channels that present the difference (in square brackets).

Category for compare difference	Icon	Description
All		All channels that have a difference of any type

<b>Left only</b>		Channels that are configured only in <i>Logging Channels</i> table A
<b>Right only</b>		Channels that are configured only in <i>Logging Channels</i> table B
<b>Different</b>		Channels, configured both in <i>Logging Channels</i> table A and B, with a difference of any type

Differences found with comparison operation are described in two interface items:

- a global list with names for categories (e.g. Groups) and names for channel or definitions with differences; each element in this list has an icon that recalls the type of difference.
- a detailed report, for single difference selected in previous list. It's a complete list of definitions that lead to incompatibility. Column *Property* shows labels for each definition together with an icon that indicates the incompatibility level. Values for the definition in TPX A and TPX B are also reported.

Three levels of incompatibility are provided:

	High importance difference
	Medium importance difference
	Low importance difference

## Resolving incompatibilities and differences

Icon buttons above report list allow user to align compared *Logging Channels* tables, selecting the desired updating strategy. *Logging Channels* tables can be globally aligned, but also incompatibilities can be selected and fixed individually.



Command	Icon	Description
Select all channels		Selects all differences or incompatibilities
Copy all definitions to right		Fixes all differences, by copying settings from TPX A to TPX B
Copy all definitions to left		Fixes all differences, by copying settings from TPX B to TPX A
Copy selected definitions to right		Fixes only selected differences, by copying settings from TPX A to TPX B
Copy selected definitions to left		Fixes only selected differences, by copying settings from TPX B to TPX A
Compare		Runs comparison operation

Corrections and modifications in each *Logging Channels* table can be saved on disk, using icon buttons in sections TPX A and TPX B.

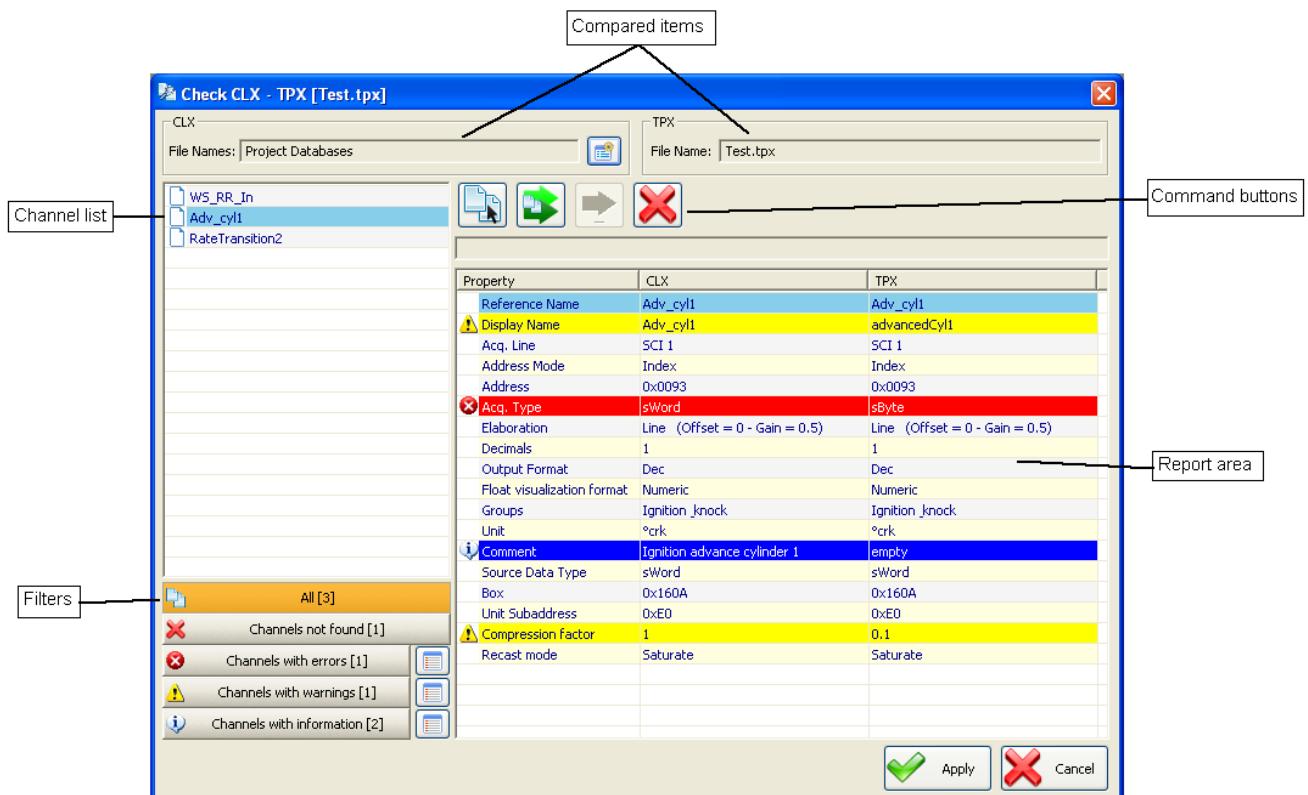
# Check CLX - TPX

*Check CLX – TPX* command is essential to check compatibility between *Logging Channels* tables TPX and the Database CLX files loaded in the current project, and ensure the correct operation for devices that will be programmed with *Logging Channels* tables.

The command compares all channels configured in the *Logging Channels* table currently loaded in the project and the collection of measurement channels for SYSMA current CLX Database, that includes all CLX files configured in the active project.

Load a *Logging Channels* table from *Projects Workspace* window or *DataLogger* main menu, then select *Tools / Check CLX – TPX...* to run the command and show *Check CLX – TPX*.

The window shows differences that are found, grouping them by importance levels, allows to analyze details by filtering criteria and to correct *Logging Channels* table, aligning it to the content of project CLX Database.



As you can see in the figure above, the window is divided in several areas:

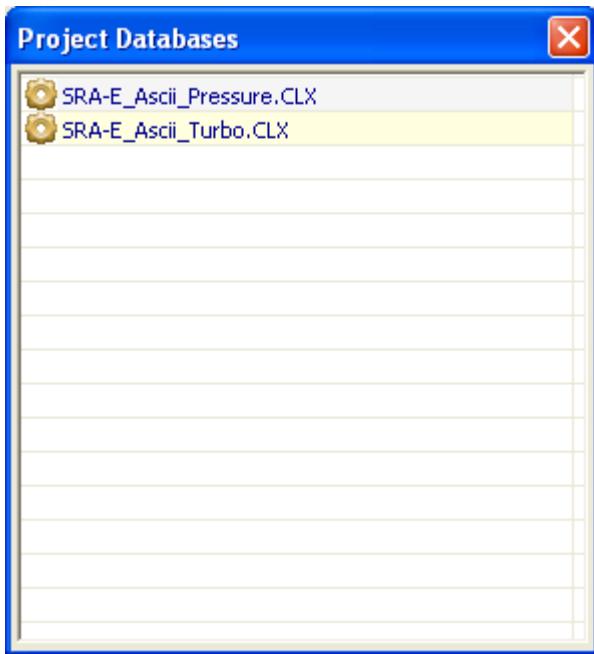
- Header area with reference to *Compared items* (Project CLX Database and *Logging Channels* table name TPX);
- *Channel list* shows the measurements with differences;
- *Report area* displays all properties of selected channel (different properties and equal properties);
- *Filters* area help to change the visualization of *Channel list*.

- *Command buttons* execute commands for aligning *Logging Channels* table to project Database.

### Compared items

In sections *CLX* and *TPX* reference names for compared items are displayed.

The *CLX* item includes channels for all valid Database CLX configured in the current project. The button <image button CLX> shows in detail the list of CLX files considered.



The *TPX* item shows the file name for the current *Logging Channels* table opened in SYSMA.

## Channel list

The *Channel list* displays all the measurement channels configured in the *Logging Channels* table that have some differences if compared to Databases CLX of the project.

## Filters

*Filter* area below *Channel list* item includes buttons for categories of differences between *Logging Channels* table and Databases CLX. In fact compare differences can also be grouped by categories. An aggregate summary for categories of differences detected can be read in buttons below *Channel list*. Each button shows the category of difference and the number of channels dealing with category type (in square brackets).

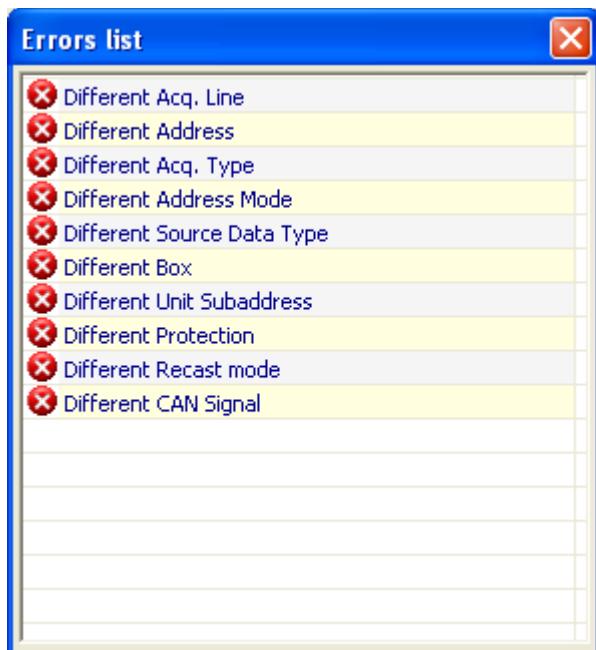
Click on each button in this area to filter the *Channel list*.

Each category corresponds to a level of importance, if the *Logging Channels* table is used to program the data logger. Available categories of differences are:

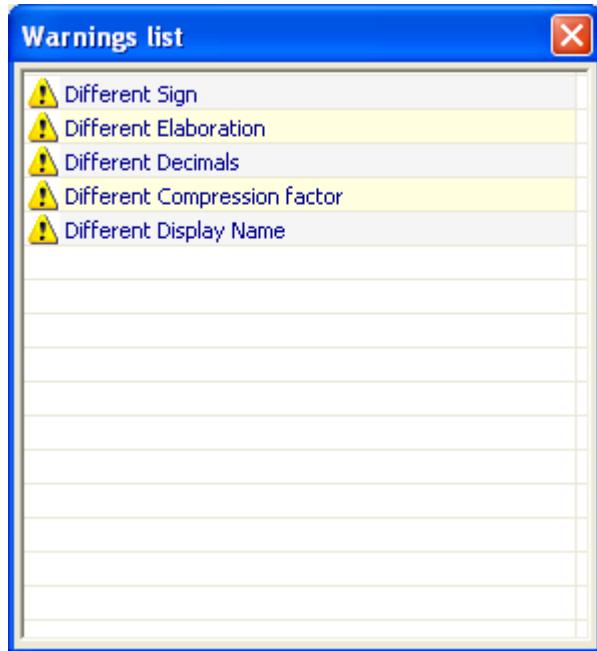
Category for compare difference	Icon	Description
All		All channels that have a difference of any type
Channels not found		Channels that can't be found in Database CLX files loaded in the project.  <i>The channels are searched by Reference Name.</i>
Channels with errors		Channels with differences at high risk compared to Database CLX. Differences of this type may corrupt the logged data and compromise operations with the data logger
Channels with warnings		Channels with differences at medium risk compared to Database CLX. Differences of this level may lead to incorrect interpretation of the data relating to the channel.
Channels with information		Channels with differences at low risk compared to Database CLX. Differences of this level don't affect data interpretation and don't lead to logging errors.

For some categories is available an additional button on the right, which lists all the possible causes related to the category itself.

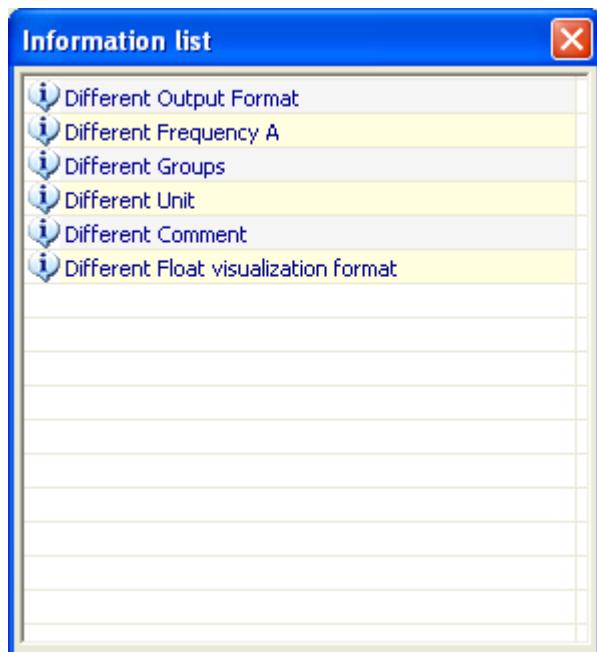
#### Errors List



## Warnings List



## Information List



## Report area

The *Report area* details all properties for channel currently selected in *Channel list*, both for Database CLX and for *Logging Channels* table. Different colours and icons that recall the importance level highlight fields with differences.

## Command buttons

Icon buttons help to execute commands for aligning *Logging Channels* table to the Database CLX.

Command	Icon	Description
Select All Channels		Select all channels with differences in <i>Channel list</i>
Copy all definitions to right		Update all definitions for selected channels in the <i>Logging Channels</i> table with definitions of correspondent channels from Database CLX
Copy selected definitions to right		Update selected definitions for selected channels in the <i>Logging Channels</i> table with definitions of correspondent channels from Database CLX
Remove selected channels		Channels selected in <i>Channel list</i> are removed from <i>Logging Channels</i> table, so any differences with Database CLX won't affect data logger usage.

SYSMA allows to check for difference between Database CLX and *Logging Channels* tables also when loading a table as the current one: the user will be asked to execute the command optionally. In this way, SYSMA seeks to ensure compliance between *Logging Channels* tables and project Database, in order to prevent improper operations of devices.