

J1939

straton user guide – Rev. 5

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straton



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1. Overview

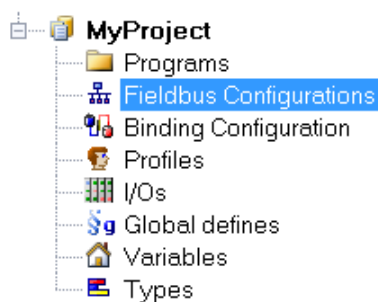
This document describes the use the straton configurator for J1939 protocol.


2. Requirement and setup

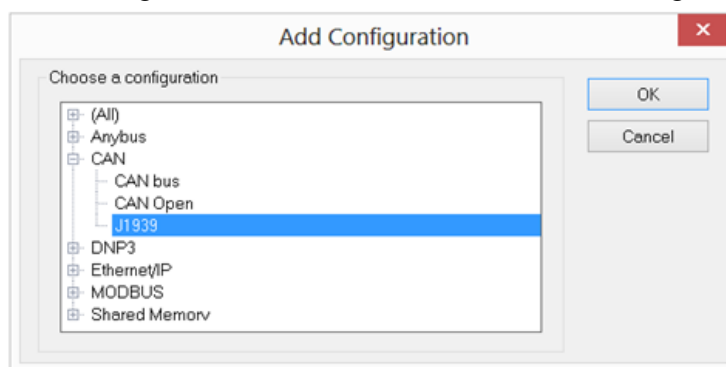
J1939 protocol is available in straton Workbench version 9.0 or later.

3. Create and configure an application

From the Workspace, run the Fieldbus Configurator:



Press the first button of the configurator toolbar () and select J1939 configuration:



The configuration is designed in the form of a tree:

Root = J1939 configuration

- ▶ J1939 port
 - Message (PGN)
 - Parameter (SPN) linked to an IEC61131-3 variable

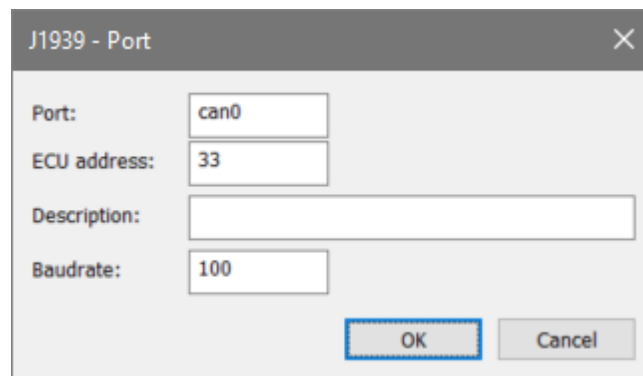
Use the following buttons of the configurator toolbar to build the tree:

- ▶ Insert a port
- ▶ Insert a message
- ▶ Insert a parameter

When the tree is configured, you can change any node by double-clicking on it in the tree.

3.1. Configuring a J1939 port

A J1939 port must be configured as shown below:



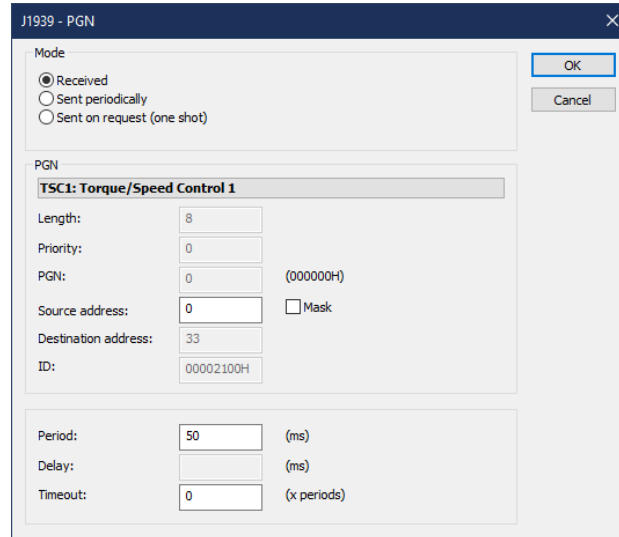
The image shows a dialog box titled "J1939 - Port" with a close button (X) in the top right corner. The dialog contains four input fields: "Port:" with the value "can0", "ECU address:" with the value "33", "Description:" which is an empty text box, and "Baudrate:" with the value "100". At the bottom right, there are two buttons: "OK" and "Cancel". The "OK" button is highlighted with a blue border.

You have to select for port:

- ▶ The physical CAN port to be used
- ▶ The ECU address of this node (the node running the IEC61131-3 application)
- ▶ A free text description (optional)
- ▶ The baudrate for this port

3.2. Configuring a J1939 message (PGN)

A J1939 message must be configured as show below:



The screenshot shows a dialog box titled "J1939 - PGN". It has a "Mode" section with three radio buttons: "Received" (selected), "Sent periodically", and "Sent on request (one shot)". There are "OK" and "Cancel" buttons. Below is a "PGN" section with a list box containing "TSC1: Torque/Speed Control 1". Below the list box are input fields for "Length:" (8), "Priority:" (0), "PGN:" (0) with "(000000H)" next to it, "Source address:" (0) with a "Mask" checkbox, "Destination address:" (33), and "ID:" (00002100H). At the bottom are "Period:" (50) (ms), "Delay:" (ms), and "Timeout:" (0) (x periods).

First of all you must specify the direction of the message:

- ▶ Received from another ECU
- ▶ Sent periodically
- ▶ Sent on request. See more information in section about "Status or control variables"

Depending on the direction of a message you will have to enter a source or destination address. The other address is the one of this ECU. All addresses are decimal numbers.

Then you need to select the PGN representing this message. Click on the PGN name to select another group. When selecting a PGN, you can enter some text in the "Search" box" for filtering the list of PGNs.

When selecting a PGN, a default priority is proposed and then can be changed.

For a received message, you can select to "mask" the priority or the source address of the message. This means that the message will be configured to receive messages with the selected PGN from any source address, or with any priority.

For a message received or sent periodically, you have to specify a period in milliseconds.

For received messages, you can configure a timeout. The timeout is to be understood as a number of periods such as configured.

For messages sent periodically you can specify a delay in milliseconds. This is an offset from the first sent message.

3.3. Configuring a J1939 parameter (SPN)

The selection of a PGN defines the set of parameters (SPN) available for it. Configuring a J1939 parameter essentially establishes a relationship in between the parameter and the IEC61131-3 variable linked to it. Variables mapped on a parameter can be global or local variables of single data type. They also can be one element of an array or a member of a structure. Below is the parameter configuration box:

Enter in the "Symbol" box the name of the variable to be mapped on the parameter. The "..." button enables you to browse for a declared variable.

Then select a SPN in the drop list.

In case of predefined values (enumeration) you can get details about possible values by clicking the "Description" button.

For analog parameters, you can specify a factor and an offset (real values) to be applied as a conversion in between the parameter and the mapped variable.

In case you specify a name of a variable not yet declared, the configurator will propose you to declare it with the best adapted data type.

3.4. Configuring a status or control variable

In addition to variables linked to parameters, you can configure some other IEC61131-3 variables to be used for:

- ▶ Receiving some status information from the J1939 stack
- ▶ Sending some commands to the stack

For declaring such a variable, select the “Diagnostic/Control” button:

Possible modes are:

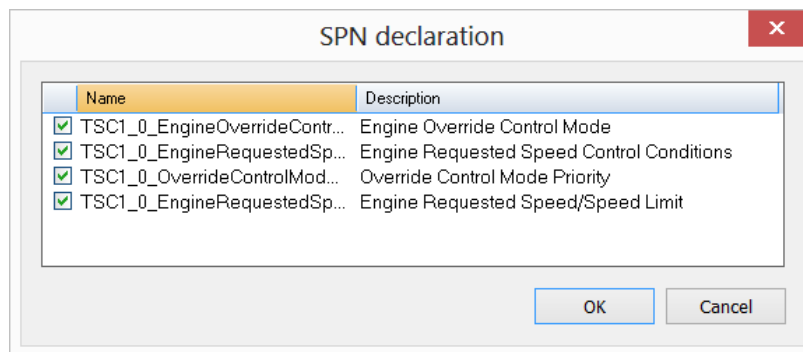
CAN errors	The variable will receive a status from the J1939 stack. Refer to your OEM for details
CAN bus off	The variable will be RUE in case the CAN bus is OFF.
Message received	The variable will be RUE if this message was received since the last PLC scan.
At least one message received	The variable will be RUE if at least one message (this one or another) was received on this J1939 port since the last PLC scan.
Send message now	For a message configured as “Sent on request”, setting the variable to RUE indicates that the message must be sent at the end of the current PLC scan. The variable is automatically reset to FALSE when the message has been sent by the stack.
Set message length	The value of the variable will be used to specify dynamically the length of the message. This is available for sent messages only.
Specific status or control	Extensions. Refer to your OEM for details

4. Additional tools

Additional commands are available from the right click popup menu in the tree.

4.1. Automatic SPN declaration

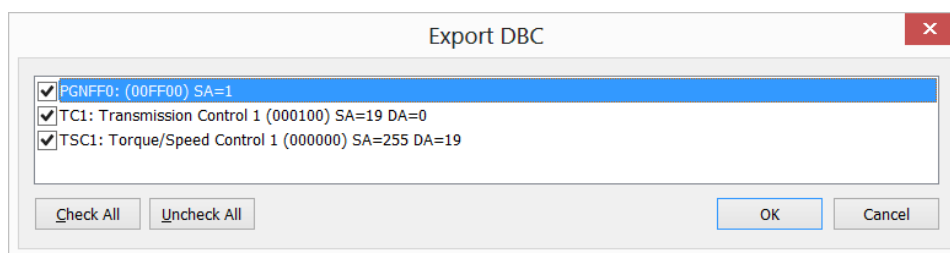
This command is available when a message is selected. It enables to automatically declare the parameters of the message:



Use the check boxes of the first column to specify which parameter you want to configure. The "Name" column indicates the name of the IEC61131-3 variable to be mapped on the parameter. You can change this name by double clicking on it.

4.2. Export of the configuration (DBC)

This command is available when a port is selected. It exports the configuration of its messages in DBC format, in order to be re-used in other tools. When exporting, you must select which messages (PGN) you want to put in the export file:

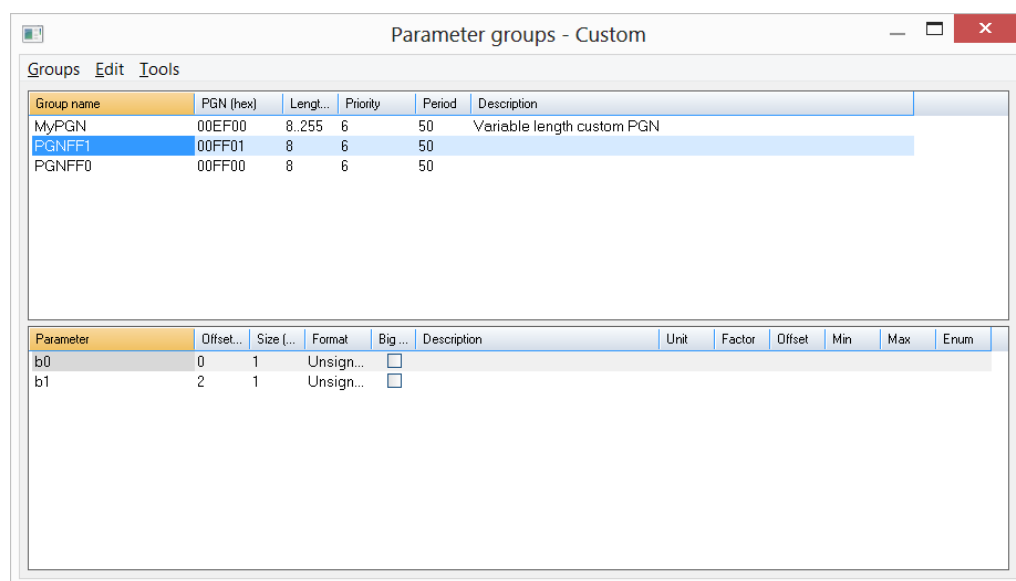


5. Defining proprietary parameter groups (PNG)

Run “Edit parameter groups” command of the right-click contextual menu in the tree to define proprietary PGNs to be used in the configuration. This command also enables you to browse the contents of PGNs of the standard J1939 library, but with no change possible in this case.

The definition of proprietary PGNs is stored locally in the project folder. Use import/export commands of the Tools menu for sharing PGNs among projects.

Below is the parameter group editor:



The first list shows defined PGNs. The list below shows the parameters (SPN) of the selected PGN. Menu commands are available:

Groups

- ▶ Standard: show the standard J1939 library (read only)
- ▶ Custom: show the user's library
- ▶ Save: save custom PGNs currently edited
- ▶ Check: consistency check of defined PGNs

Edit

- ▶ New PGN or new SPN
- ▶ Delete the selected PGN or SPN
- ▶ Search in the list

Tools

- ▶ Show PGN numbers as hexadecimal values
- ▶ Import/export PGN definitions

Possible values for custom PGN numbers are:

- ▶ 61184 (00EF00hex)
- ▶ 126720 (01EF00 hex)
- ▶ 65280 .. 65535 (00FF00 hex .. 00FFFF hex)

A PGN is identified by:

- ▶ A name (must conform to IEC61131-3 naming rules)
- ▶ A PGN number
- ▶ A length in bytes
- ▶ A default priority
- ▶ A free text description

The name of the PGN and its PGN number must be unique.

A SPN is defined by;

- ▶ A name (must conform to IEC61131-3 naming rules)
- ▶ An offset in bits within the PGN
- ▶ A size in bits
- ▶ A data format (signed or unsigned or real or "raw" (see below)
- ▶ A byte arrangement conversion (big endian or little endian

The name of a SPN must be unique within the PGN.

Other attributes are used for auto-documentation of the SPN when configured:

- ▶ An optional unit name
- ▶ Optional factor and offset (real numbers)
- ▶ Option minimum and maximum values
- ▶ Some predefined values (enumeration)