

Hardware settings overview

The **Hardware Settings** node allows you to configure the settings for the hardware on the local device as well as any remote/secondary devices, such as an SJU.

Analog inputs

You can configure the name of analog inputs on the **Hardware Settings** node (1). Underneath each input label is a connection identifier in the format 'CX.Y', where X and Y are values that identify the connector and the pin of the device, respectively (2).

The screenshot shows the 'Hardware Settings' interface for 'Local (Badenia 5) - Analog Inputs'. The main area contains a grid of 16 input configuration cards, each with a 'Name' field and a 'Connection' field. The inputs are labeled Input 01 through Input 16. Input 01 is highlighted in blue and has its name set to 'Example Analog Input' and its connection to 'C2.26'. The left sidebar shows a tree view with 'Local (Badenia 5)' expanded to 'Analog Inputs (40)'. Below the grid, a callout box provides a detailed view of the 'Input 01' configuration.

Input	Name	Connection
Input 01	Example Analog Input	C2.26
Input 02	Input 02	C2.12
Input 03	Input 03	C2.25
Input 04	Input 04	C2.11
Input 05	Input 05	C2.9
Input 06	Input 06	C2.10
Input 07	Input 07	C2.8
Input 08	Input 08	C2.24
Input 09	Input 09	C2.7
Input 10	Input 10	C2.23
Input 11	Input 11	C2.22
Input 12	Input 12	C2.6
Input 13	Input 13	C2.21
Input 14	Input 14	C2.5
Input 15	Input 15	C2.20
Input 16	Input 16	C2.4

This callout box shows the configuration for 'Input 01'. It features a 'Name' field containing 'Example Analog Input' and a 'Connection' field containing 'C2.26'. A red box highlights the 'Connection' field, and a red '2' is placed next to it. A red '1' is placed next to the 'Name' field.

CAN ports

You can configure the name of the CAN ports on the **Hardware Settings** node (1). Underneath each CAN port label is a connection identifier in the format 'CX.Y', where X and Y are values that identify the connector and the pin of the device respectively (2). You can enable a selectable 120 Ohm CAN termination (3). The bar display shows the consumed bandwidth of the CAN port (4). This consumed bandwidth only represents the bandwidth allocation that Toolset can identify (configured in the CAN streams). Other messages on the bus are only visible to an external bus listener for the external devices.

CAN 01	CAN 02	CAN 03	CAN 04	CAN 05	CAN 06	CAN 07	CAN 08
Name: CAN 01	Name: CAN 02	Name: CAN 03	Name: CAN 04	Name: CAN 05	Name: CAN 06	Name: CAN 07	Name: CAN 08
Connection: C1.30 (hi), C1.18 (lo)	Connection: C1.29 (hi), C1.17 (lo)	Connection: C1.34 (hi), C1.35 (lo)	Connection: C1.24 (hi), C1.33 (lo)	Connection: C1.11 (hi), C1.25 (lo)	Connection: C3.49 (hi), C3.53 (lo)	Connection: C3.50 (hi), C3.54 (lo)	Connection: C3.36 (hi), C3.43 (lo)
Terminate CAN Bus? <input checked="" type="checkbox"/>							
CAN Packets: 0% (0)							

CAN 01

- Name: Example CAN Port
- Connection: C1.30 (hi), C1.18 (lo)
- Terminate CAN Bus?
- CAN Packets: 0% (0)

Digital inputs

You can configure the name of digital inputs on the **Hardware Settings** node (1). Underneath each input label is a connection identifier in the format 'CX.Y', where X and Y are values that identify the connector and the pin of the device respectively (2). There are three digital input types (**Level**, **Beacon**, and **Pulse**) selected from the **Type** check boxes (3).

Digital 01

1 Name

2 Connection

3 Type Level Beacon Pulse

Types of digital inputs

When you configure the **Hardware** settings of a digital input, you can select from three options based on the application type. You can define sensors as shown below, but within the **Hardware** settings you can also configure the debug channels created.

Level: Used for simple, digital push button, On/Off inputs. A standard configuration that allows you to generate channels to view the output level of the digital sensor.

Channel Rates	
Channels	<input checked="" type="radio"/> Logger 0 : Rate Group 0 <input type="radio"/> SS <input type="text"/> HS <input type="text"/>
Digital 01	Off

Beacon: Used when you configure an end of lap timing beacon (see **Beacons**). You can generate multiple channels for debug from the digital pulse duration and start time. This is useful when you use an IR beacon to detect the start finish line, as a standard pulse time of ~12ms is usually required.

Channel Rates	
Channels	<input checked="" type="radio"/> Logger 0 : Rate Group 0 <input type="radio"/> SS <input type="text"/> HS <input type="text"/>
Digital 01 Count	Off
Digital 01 Pulse Duration	Off
Digital 01 Signal Level	Off
Digital 01 Start Time	Off

Pulse: Used when you configure rotational or DF11i wheel speed inputs where the number of pulses correlates to the number of revolutions. This generates frequency channels for rotational sensors and the time between teeth.

Channel Rates	
Channels	<input checked="" type="radio"/> Logger 0 : Rate Group 0 <input type="radio"/> SS <input type="text"/> HS <input type="text"/>
Digital 01	Off
Digital 01 Count	Off
Digital 01 Last Edge Time	Off

Digital PWM outputs

The screenshot shows the 'Hardware Settings' window for a local device (Badenia 5). The 'Digital PWM Outputs (4)' section is selected in the left sidebar. The main area displays four PWM output configurations:

PWM Output 01	PWM Output 02	PWM Output 03	PWM Output 04
Name: PWM Output 01	Name: PWM Output 02	Name: PWM Output 03	Name: PWM Output 04
Connection: C2.16	Connection: C2.29	Connection: C3.38	Connection: C3.46
Mode: High-side	Mode: High-side	Mode: High-side	Mode: High-side

For devices with Digital PWM Output capability, you can configure the name of the Digital PWM Outputs on the **Hardware Settings** node (1.). Underneath each PWM Output label is a connection identifier in the format 'CX.Y', where X and Y are values that identify the connector and the pin of the device respectively (2). The PWM output **Mode** (high-side or low-side) is displayed (3).

A close-up view of the 'PWM Output 01' configuration. Three elements are highlighted with red boxes and numbered:

1. Name: Example PWM Output
2. Connection: C2.16
3. Mode: High-side

Excitations

You can configure the name of power supplies (known as 'excitations') on the **Hardware Settings** node (1). Underneath each **Excitation** label is a connection identifier in the format 'CX.Y', where X and Y are values that identify the connector and the pin of the device, respectively (2). Select the **Enabled?** checkbox (3) to enable or disable the excitation by selecting the Some excitations offer variable output voltage capability. For these variable excitations you can click the required checkbox to set the output voltage (4).

The screenshot shows the 'Hardware Settings' interface for a local device named 'Badenia 5'. The 'Excitations' section is active, showing a list of ten excitation settings. Each setting includes a name, a connection identifier, an 'Enabled?' checkbox, and a voltage selection (5.0 V or 12.0 V). The 'Sensor Power 01' setting is highlighted in blue.

Excitation Name	Connection	Enabled?	Voltage
Sensor Power 01	C2.15	<input checked="" type="checkbox"/>	5.0 V / 12.0 V
Sensor Power 02	C2.28	<input checked="" type="checkbox"/>	5.0 V / 12.0 V
Sensor Power 03	C2.13	<input checked="" type="checkbox"/>	5.0 V
Sensor Power 04	C2.14	<input checked="" type="checkbox"/>	5.0 V
Sensor Power 05	C2.27	<input checked="" type="checkbox"/>	5.0 V
Sensor Power 06	C3.31	<input checked="" type="checkbox"/>	5.0 V / 12.0 V
Sensor Power 07	C3.39	<input checked="" type="checkbox"/>	5.0 V / 12.0 V
Sensor Power 08	C3.16	<input checked="" type="checkbox"/>	5.0 V
Sensor Power 09	C3.23	<input checked="" type="checkbox"/>	5.0 V
Sensor Power 10	C3.24	<input checked="" type="checkbox"/>	5.0 V

This close-up view of the 'Sensor Power 01' configuration form highlights four key fields with numbered callouts:

- Name:** Example Excitation 1
- Connection:** C2.15
- Enabled?:**
- Voltage:** 5.0 V / 12.0 V

LIN ports

You can configure the name of the LIN ports on the **Hardware Settings** node (1). Underneath each LIN port label is a connection identifier in the format 'C.X.Y', where X and Y are values that identify the connector and the pin of the device respectively (2).

The screenshot shows the 'Hardware Settings' window for 'Local (Badenia 5) - LIN Ports'. The left sidebar lists various hardware components, with 'LIN Ports (2)' selected. The main area is titled 'Configure the LIN ports for the device.' It features two columns: 'LIN 01' and 'LIN 02'. Under 'LIN 01', there are two numbered items: '1 Name LIN 01' and '2 Connection C1.10', both highlighted with red boxes. Under 'LIN 02', there are 'Name LIN 02' and 'Connection C1.9'.

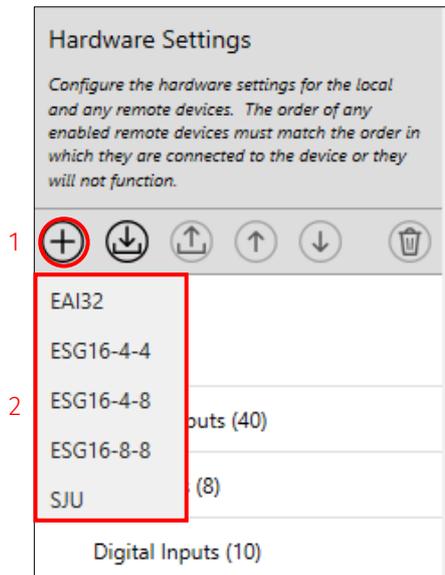
Serial Ports

On the **Hardware Settings** node, underneath each **Serial Port** label is a connection identifier in the format 'C.X.Y', where X and Y are values that identify the connector and the pin of the device, respectively (1). You can configure the names of the **Serial Rx** and **Tx Ports** (2).

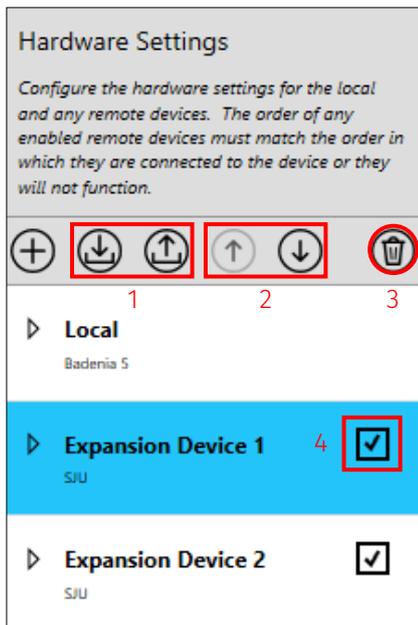
The screenshot shows the 'Hardware Settings' window for 'Local (Badenia 5) - Serial Ports'. The left sidebar lists hardware components, with 'Serial Ports (2)' selected. The main area is titled 'Configure the serial ports for the device.' It features two columns: 'Serial 01' and 'Serial 02'. Under 'Serial 01', there are two numbered items: '1 Connection C1.37 (rx), C1.36 (tx)' and '2' which includes 'Interface RS232', 'Serial 01 (Rx) Serial 01 (Rx)', and 'Serial 01 (Tx) Serial 01 (Tx)', all highlighted with red boxes. Under 'Serial 02', there are 'Connection C1.31 (rx), C1.32 (tx)', 'Interface RS232', 'Serial 02 (Rx) Serial 02 (Rx)', and 'Serial 02 (Tx) Serial 02 (Tx)'.

Configure an EtherCat expansion device

To add an EtherCat expansion device such as the EAI32 or SJU click the + button (1), and then select the device from the dropdown menu (2)



You can add multiple expansion devices and import and export previously configured expansion devices between existing setups (1). The order of the devices in the list must match the order in which they are physically connected on the EtherCat bus. Use the reorder tools (2) to change the order of the devices in the list up or down (2). Use the 'bin' option (3) to delete expansion devices from the list. If an expansion device is removed from the vehicle but you do not want to delete the device configuration from the list, deselect the 'enable' box (4).



The inputs and outputs for the expansion device appear in **Hardware Settings** in the same format and are configured in the same way as the local device hardware settings.

Hardware Settings
 Configure the hardware settings for the local and any remote devices. The order of any enabled remote devices must match the order in which they are connected to the device or they will not function.

Local
 Badenia 1

Analog Inputs (40)

CAN Ports (8)

Digital Inputs (10)

Digital PWM Outputs (4)

Excitations (10)

LIN Ports (2)

Serial Ports (2)

SJU 0
 SJU

Analog Inputs (24)

Digital Inputs (4)

Digital PWM Outputs (6)

Excitations (12)

SJU 0 (SJU) - Excitations
 Configure the excitations for the device.

SJU 0 - Exc 01	SJU 0 - Exc 02	SJU 0 - Exc 03	SJU 0 - Exc 04
Name: SJU 0 - Exc 01 Connection: Yellow 16 Voltage: <input checked="" type="radio"/> Off <input type="radio"/> 5.00V <input type="radio"/> 12.00V	Name: SJU 0 - Exc 02 Connection: Yellow 9 Voltage: <input checked="" type="radio"/> Off <input type="radio"/> 5.00V <input type="radio"/> 12.00V	Name: SJU 0 - Exc 03 Connection: Yellow 8 Voltage: <input checked="" type="radio"/> Off <input type="radio"/> 5.00V <input type="radio"/> 12.00V	Name: SJU 0 - Exc 04 Connection: Yellow 3 Voltage: <input checked="" type="radio"/> Off <input type="radio"/> 5.00V <input type="radio"/> 12.00V
SJU 0 - Exc 05	SJU 0 - Exc 06	SJU 0 - Exc 07	SJU 0 - Exc 08
Name: SJU 0 - Exc 05 Connection: Yellow 54 Voltage: <input checked="" type="radio"/> 5.00V	Name: SJU 0 - Exc 06 Connection: Yellow 55 Voltage: <input checked="" type="radio"/> 5.00V	Name: SJU 0 - Exc 07 Connection: Yellow 51 Voltage: <input checked="" type="radio"/> 5.00V	Name: SJU 0 - Exc 08 Connection: Yellow 52 Voltage: <input checked="" type="radio"/> 5.00V
SJU 0 - Exc 09	SJU 0 - Exc 10	SJU 0 - Exc 11	SJU 0 - Exc 12
Name: SJU 0 - Exc 09 Connection: Yellow 46 Voltage: <input checked="" type="radio"/> 5.00V	Name: SJU 0 - Exc 10 Connection: Yellow 39 Voltage: <input checked="" type="radio"/> 5.00V	Name: SJU 0 - Exc 11 Connection: Yellow 31 Voltage: <input checked="" type="radio"/> 5.00V	Name: SJU 0 - Exc 12 Connection: Yellow 24 Voltage: <input checked="" type="radio"/> 5.00V

Note: When an expansion device is enabled, the expansion device channels are automatically populated on the **Channel Rates** node, but the logging rates must be set.

Channel Rates

Logger 0 : Rate Group 0

SS

HS

Expansion Device 1 - D 01	5 Hz
Expansion Device 1 - D 02	Off
Expansion Device 1 - D 03	1 Hz
Expansion Device 1 - D 04	2 Hz
Expansion Device 1 - D Out 01 Current	5 Hz
Expansion Device 1 - D Out 01 Voltage	10 Hz
Expansion Device 1 - D Out 02 Current	20 Hz
Expansion Device 1 - D Out 02 Voltage	50 Hz
Expansion Device 1 - D Out 03 Current	100 Hz
Expansion Device 1 - D Out 03 Voltage	200 Hz
Expansion Device 1 - D Out 04 Current	500 Hz
Expansion Device 1 - D Out 04 Voltage	1 kHz
Expansion Device 1 - D Out 04 Current	Off