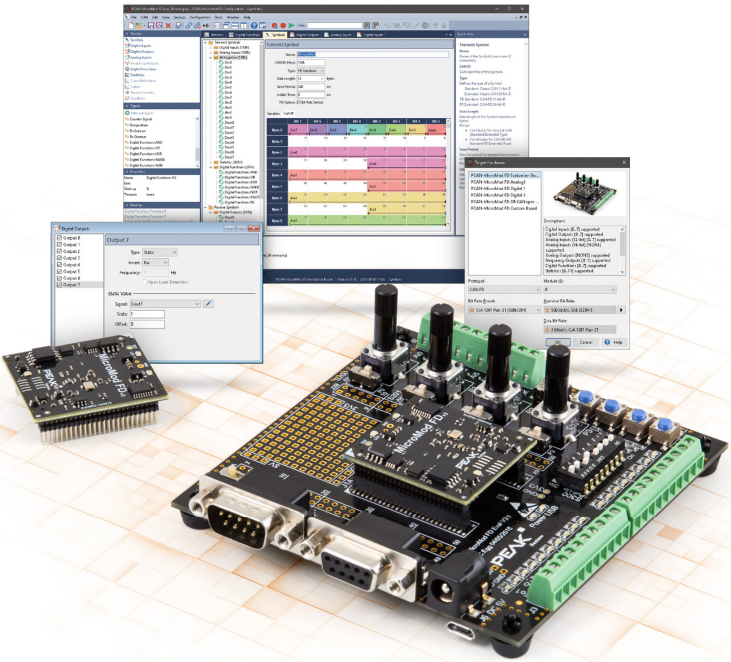
PCAN-MicroMod FD

Configuration Tutorial



Document version 1.0.0 (2020-05-11)

PEAK System

Relevant products

Product Name	Model	Part number
PCAN-MicroMod FD Evaluation Board		IPEH-003081
CAN-FD-Interface der PCAN-Reihe (z.B. PCAN-USB FD)		IPEH-004022
PCAN-MicroMod FD Configuration Software		-
PCAN-Explorer 6		IPES-006000
PCAN-View 4		-

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1 Introduction

This step-by-step tutorial is intended to help you work with the PCAN-MicroMod FD Evaluation Board and the PCAN-MicroMod FD Configuration Software.

1.1 Requirements

For the tutorial you need the following hardware and software:

- **PCAN-MicroMod FD Evaluation Board**
  (click here to open the product page)

  Must be connected to your PC. For more details, take a look into the respective hardware manual on the product page.
- **PCAN-MicroMod FD Configuration Software**
  (click here to open the product page)

  The software must be installed on your PC.
- **CAN FD interface of PEAK-System (e.g. PCAN-USB FD)**

  Must be connected to your PC. For more details, take a look into the respective hardware manual on the product page.
- **PCAN-View 4**
  (click here to open the product page)

  The free software must be installed on your PC.
- **PCAN-Explorer 6**
  (click here to open the product page)

  The purchasable software is used for the evaluation of the example results. The PCAN-Explorer 6 is not required for the configuration of PCAN-MicroMod FD products.

1.2 PCAN-MicroMod FD Evaluation Board

This product is an evaluation board for the PCAN-MicroMod FD and allows the conception and development of own circuits with CAN connection and I/O functionality. Via pick-offs, screw terminals, switches, and potentiometers, the user can access the resources of the attached PCAN-MicroMod FD and check configurations or test circuits.

The configuration is done with a supplied Windows software which transfers the configuration data to the module via CAN.

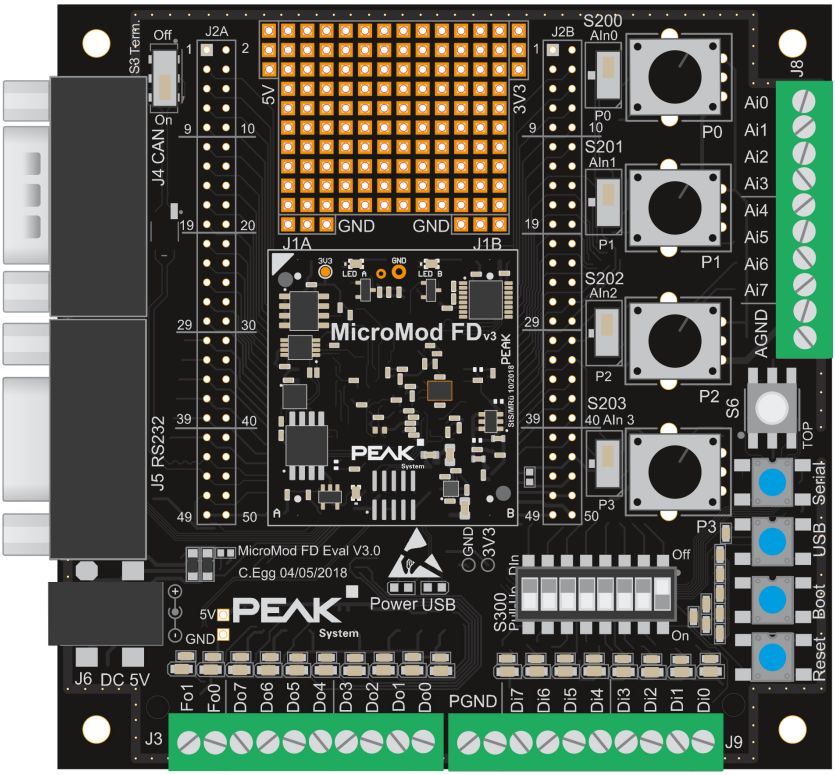

Figure 1: PCAN-MicroMod FD Evaluation Board

1.3 PCAN-MicroMod FD Configuration Software

The PCAN-MicroMod FD Configuration software can be used to configure all products based on the PCAN-MicroMod FD series. Specific configuration options are available for the PCAN-MicroMod FD itself, the motherboards, and the PCAN-MicroMod FD Evaluation board, depending on the hardware in use.

Configuration data is transmitted to the module via CAN. Use of unique module IDs allows independent configuration of multiple devices on a single CAN bus.

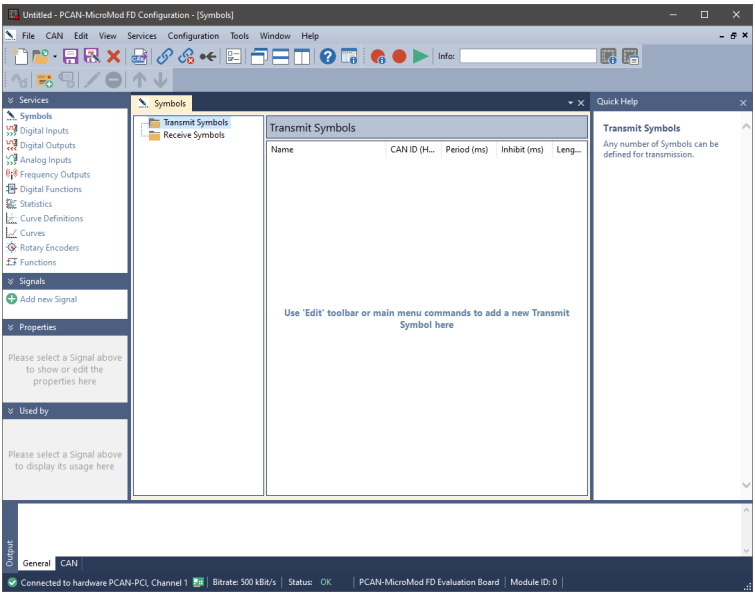

Figure 2: PCAN-MicroMod FD Configuration software

Tip: Use the **Quick Help** side window on the right to find out more information. You can also call up the software help via F1.

2 Examples

In this chapter you will find various examples. Examples are included as project files (`*.mmcproj`) in the download package.

Note: The purchasable PCAN-Explorer 6 software is used to gain a better understanding or even required for the evaluation (e.g. Functions Service). The PCAN-Explorer 6 is not required for the configuration of PCAN-MicroMod FD products.

Tip: You can simply take note of the results of the respective example in this tutorial - without the PCAN-Explorer 6 software.

2.1 Example 1: Digital Outputs - Control LEDs via CAN Messages

1. Open **PCAN-MicroMod FD Configuration**.
2. Click on **File** and **New**.

   Target Hardware window appears.
3. Select the following options:
   - PCAN-MicroMod FD Evaluation Board
   - **Protocol**: CAN 2.0
   - **Bit Rate Preset**: 500 kbit/s
   - **Module ID**: make sure that this number is equal to the selected **Module ID** of the used PCAN-MicroMod FD Evaluation Board.

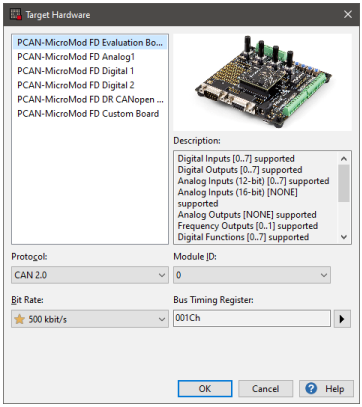

Figure 3: Target Hardware window

4. Open the **Digital Outputs** service.

   The **Digital Outputs** window appears.

5. Click on **Add new Signal** in the **Signals** sidebar and add **8** new Signals.

6. Rename them to **do00 – do07**.

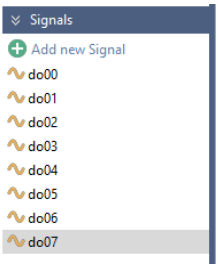

Figure 4: Signals

7. Go to the **Symbols** service.

8. Add 8 **Receive Symbols.**

9. In the **Name** field of the **Receive Symbol** tab, rename the Symbols to **00rec – 07rec.**

10. Edit the CAN IDs **100h – 107h** in the **CAN ID (Hex)** field.

    Set the **Data Length** of the Symbols **00rec – 07rec** to **1 Bytes**.

11. Perform a right mouse-click on the **00rec** symbol and select **Add Variable**.

    The **Signals** dialog box opens.

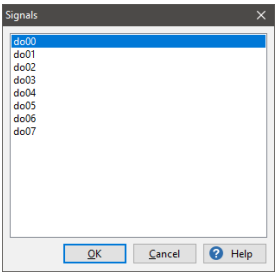

Figure 5: Signals dialog box

12. Select **do00**.

13. Do the same with the **01rec – 07rec (do01 – do07)** symbols.

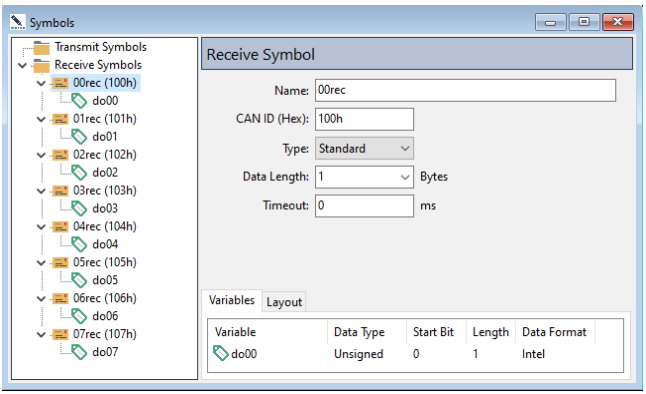

Figure 6: Symbols window

14. In the **Digital Outputs** window, activate the **Output 0** checkbox.
15. In the **Output** tab, select **do00** in the **Signal** drop-down menu.
16. Do the same with the **do01 – do07** signals and **Output 1 – Output 7**.

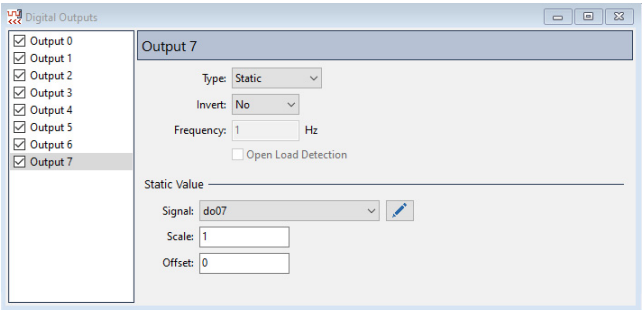

Figure 7: Digital Outputs window

17. Before this configuration can be send to PCAN-MicroMod FD, click on the **Connect** toolbar item and select your available PCAN hardware.

    Consider the settings in step 3.
18. Click on **Send Configuration**.
19. Select the module and click **Send**.

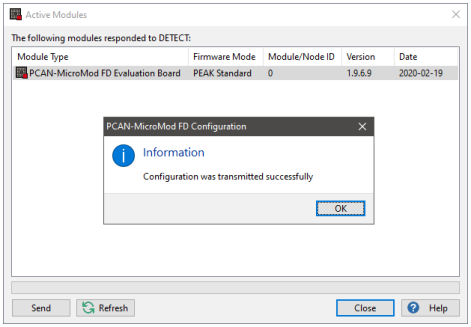

Figure 8: Active Modules window

Next steps in PCAN-View 4:

1. Open **PCAN-View**.
2. In the **Connect** window, create a connection with a **Nominal Bite Rate** of **500 kbit/s**.
3. Click on the **New Message** toolbar button.
4. In the **New Transmit Message** window, set the **ID** to **100h**, the **Length** to **1, Data** to **01,** and **Cycle Time** to **500 ms.**

   The **Data** value of **01** means the LED lights up. A data value of **00** means that the LED does not light up.
5. Create further CAN messages with the **IDs 101h** to **107h** and set different **Data** values **(01** or **00).**
6. Send these CAN messages and control the **Do0 – Do7** LEDs on the PCAN-MicroMod FD Evaluation Board.

   Last but not least, set the values of the individual CAN messages from **01** to **00** or vice versa and switch the **Do0 – Do7** LEDs on and off.

2.2 Example 2: Analog Inputs – Control LEDs via the 4 Potentiometers

1. Open the PCAN-MicroMod FD Configuration software.
2. Click on **New Configuration**.
3. Select the following options:
   - PCAN-MicroMod FD Evaluation Board
   - **Protocol**: CAN FD
   - **Bit Rate Preset**: SAE J2284-4 (500k/2M)
   - **Module ID**: make sure that this number is equal to the selected **Module ID** of the used PCAN-MicroMod FD Evaluation Board.

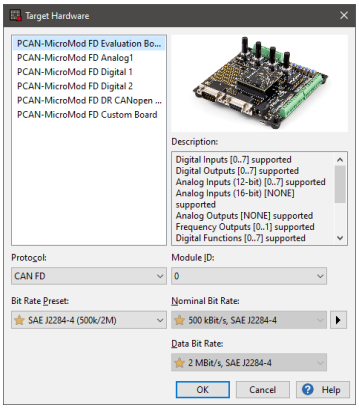

Figure 9: Target Hardware window

4. Confirm the settings with **OK**.
5. Add 4 signals by clicking on **Add new Signal** in the **Signals** sidebar.
6. Rename the signals to **pot00 - pot03**.

Figure 10: Signals for this example

7. Open the **Analog Inputs** service.
8. Activate **Input 0 – Input 3**.
9. Add the signals **pot00 – pot03** to each of the inputs with a right mouse click.

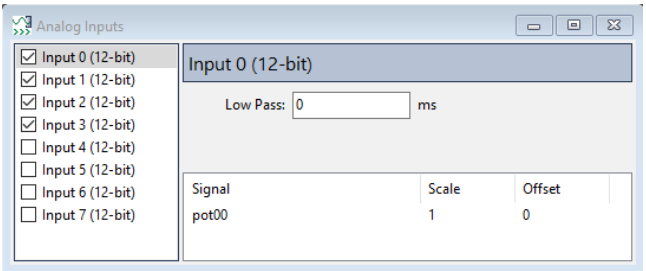

Figure 11: Analog Inputs window

10. Open the **Digital Outputs** service.
11. Activate the **Output 0 – Output 7** items.
12. Click on **Output 0**.
13. In the **Type** drop-down menu, select **PWM** and change the **Frequency** to **100 Hz**.
14. Do the same for **Output 1** to **Output 7**.
15. Add the **pot00 – pot03** signals in recurring sequence to the outputs, for example **pot00** to **Output 0** and **Output 4,** and change the scale to **0.025**.

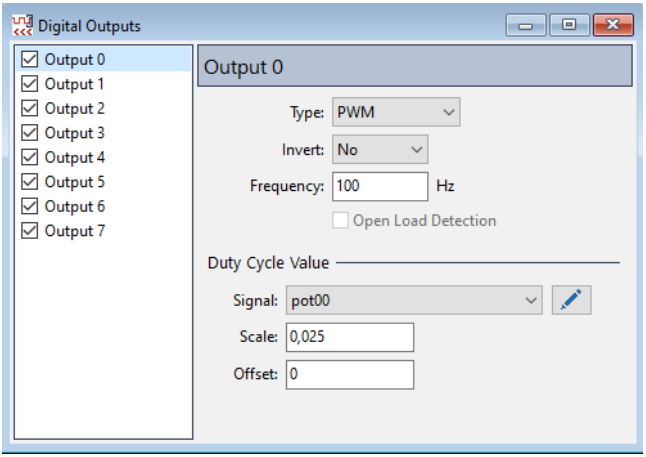

Figure 12: Digital Outputs window

16. Before this configuration can be send to PCAN-MicroMod FD, click on the **Connect** and select your available PCAN hardware (e.g PCAN-USB FD).

    Consider the settings in step 3.

17. Click on **Send Configuration**.

18. Select the module and click **Send**.

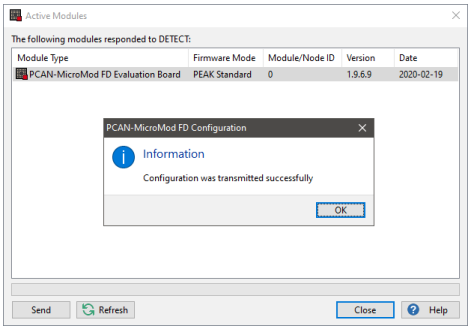

Figure 13: Active Modules window

Do the following on the PCAN-MicroMod FD Evaluation Board:

1. Ensure that the **S200** switch on the board is set to **P0**.
2. Turn the **P0** potentiometer.

   Do0 and **Do4** LEDs in-/decrease their brightness.
3. Turn the other potentiometer (**P2 –P3**) and in-/decrease the brightness of the other LEDs.

   Which LEDs are influenced by which potentiometer (**P0 –P3**) depends on the selected assignment of the **pot00 – pot03** signals to the output items in the **Digital Output** Service.

Tip: You can assign the signals as you wish. For example, it is also possible to select only one signal and thus switch all LEDs on or off via one CAN message. Try it out.

2.3 Example 3: Creating a Curve and Curve Definition

1. Open the PCAN-MicroMod FD Configuration software.
2. Click on **New Configuration**.
3. Select the following options:
   - PCAN-MicroMod FD Evaluation Board
   - **Protocol**: CAN FD
   - **Bit Rate Preset**: SAE J2284-4 (500k/2M)
   - **Module ID**: make sure that this number is equal to the selected **Module ID** of the used PCAN-MicroMod FD Evaluation Board.

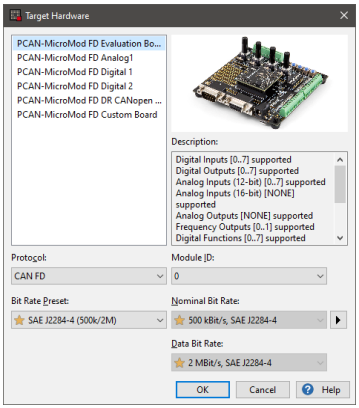

Figure 14: Target Hardware window

1. Confirm the settings with **OK**.
2. Add two new signals by clicking on **Add new Signal** in the **Signals** sidebar.
3. Rename the signals to **Signal-in** and **Signal-out**.

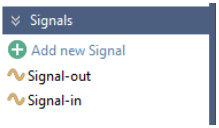

Figure 15: Signals for this example

4. Go to the **Symbols** service.
5. Add a symbol to the **Transmit Symbols** and **Receive Symbols**.
6. Rename the transmit symbol to **transmit0**, edit the **CAN ID** to **500h**, and set the **Send Period** to **100 ms**.
7. Rename the receive symbol to **receive0** and edit the **CAN ID** to **100h**.
8. Perform a right mouse-click on the **transmit0** symbol and select **Add Variable**.

   The **Signals** dialog box opens.
9. Select the **Signal-out** signal in the **Signals** dialog box and confirm with **OK**.
10. Add **Signal-in** to **receive0**.
11. Click on **Signal-out** and extend the **Length** to **16 bits**.
12. Do the same with **Signal-in**.

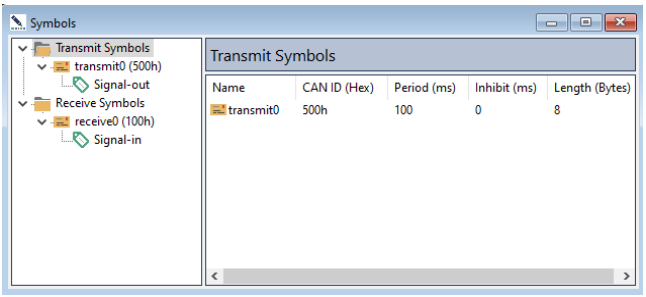

Figure 16: Symbols for this example

13. Open the **Curve Definitions** service.
14. Activate **Definition 0** and select **2** or more points in **Point Count**.

    By default, the points are located on the x axis. Move them to another (random) place in the diagram.

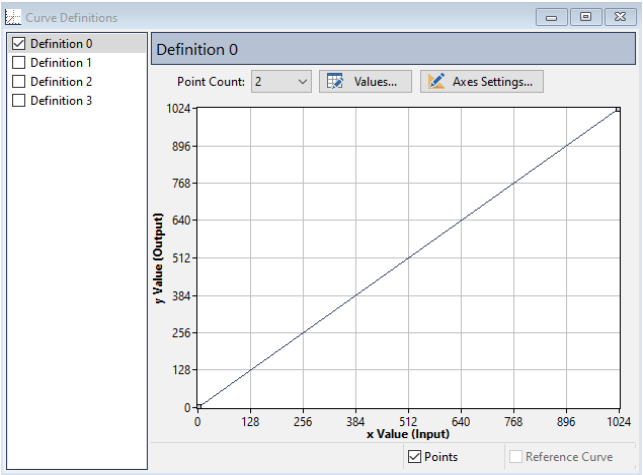

Figure 17: Curve Definitions window

15. Open the **Curves** services.
16. Activate **Curve 0** and select **Definition 0**.
17. For the **Input Signal**, select **Signal-in**.
18. For the **Output Signal**, select **Signal-out**.

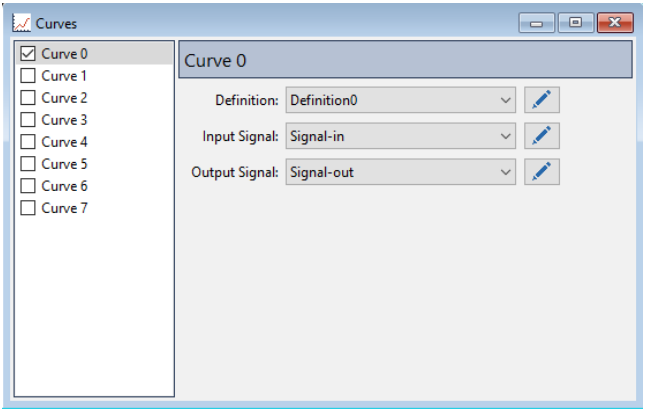

Figure 18: Curves window

19. Click on **Export** and **Into Symbols File...**.
20. Edit the **File Name** (e.g. `Example-x.sym`).
21. Select the **Direction Reverse** option.

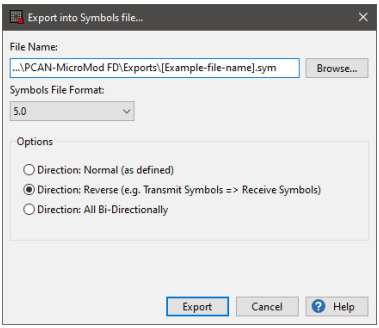

Figure 19: Export into Symbols file

22. Confirm with **Export** to create the Symbols file.
23. Before this configuration can be send to PCAN-MicroMod FD, click on the **Connect** and select your available PCAN hardware (e.g PCAN-USB FD).

Consider the settings in step 3.

24. Click on the **Send Configuration** toolbar button.
25. Select the module and click **Send**.

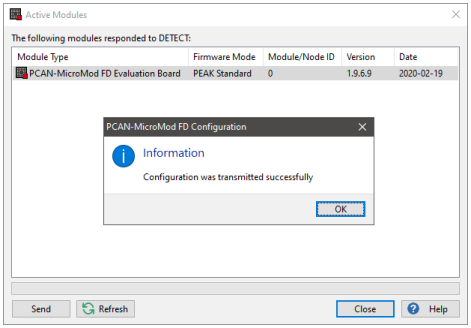

Figure 20: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Create an empty project and establish a connection to our CAN bus.
3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select **Apply**.
5. You should receive CAN messages with the **CAN ID 500h**.
6. In the **Receive / Transmit** window of the PCAN-Explorer 6, add a transmit message with the **CAN ID 100h**.
7. Double-click on the **Signal-in** in the **Data** column and enter a random **Value** within the **range 0 – 1024**.

   The received CAN message 500h should display the y-value (**Signal-out**) to the respective x-value (**Signal-in**) of the transmitted message.

2.4 Examples 4–7: Digital Functions

2.4.1 First Steps for Examples 4 - 7

1. Open the PCAN-MicroMod FD Configuration software.
2. Click on **New Configuration**.
3. Select the following options:
   - PCAN-MicroMod FD Evaluation Board
   - **Protocol**: CAN FD
   - **Bit Rate Preset**: SAE J2284-4 (500k/2M)
   - **Module ID**: make sure that this number is equal to the selected **Module ID** of the used PCAN-MicroMod FD Evaluation Board.

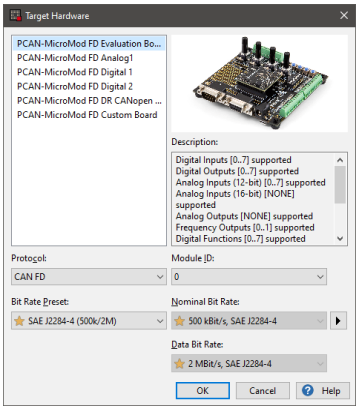

Figure 21: Target Hardware window

4. Confirm the settings with **OK**.
5. Click on the **Connect** toolbar button and select your available PCAN hardware (e.g PCAN-USB FD).

Consider the settings in step 3.

6. Add 1 new signal by clicking on **Add new Signal** in the **Signals** sidebar.
7. Rename the signal to **Signal-out**.

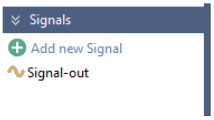

Figure 22: Signals for this example

8. Go to the **Symbols** service.
9. Right mouse-click on **Transmit Symbols** and select **Add Symbol**.
10. Rename the transmit symbols to **transmit0**.
11. Set the **CAN ID** to **100h** and the **Send Period** to **100 ms**.
12. Perform a right mouse-click on the **transmit0** symbol and select **Add Variable**.

    The **Signals** dialog box opens.
13. Select the **Signal-out** signal and confirm with **OK**.
14. Click on the **Signal-out** variable and edit the **Length** to **16 bits**.

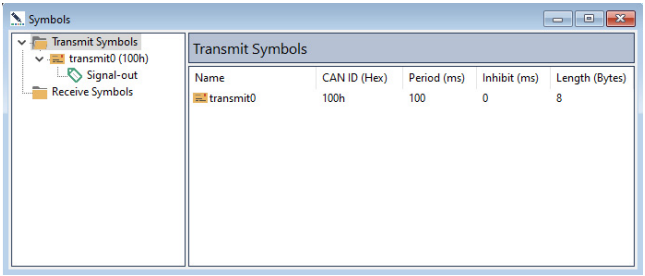

Figure 23: Symbol for this example

- Now continue with the corresponding examples (4-7):
  - Example 4: Digital Function (&, “AND”)
  - Example 5: Digital Function (≥ 1, “OR”)
  - Example 6: Digital Function (RS Flip-Flop; SET, RESET)
  - Example 7: Digital Function (Feedback)

2.4.2 Example 4: Digital Function (&, “AND”)

1. Proceed the steps in chapter 2.4.1.
2. Open the **Digital Functions** service.
3. Close the switches next to **Digital Input 0**, **Digital Input1**, **Signal Output**, and **Digital Output 0**.

   The red colored turns green.
4. In the **Signal** drop-down menu, select **Signal-out** for **Function 0**.
5. Set the **Cycle Time** to **100 ms**.
6. Click on the white box and set **&**.

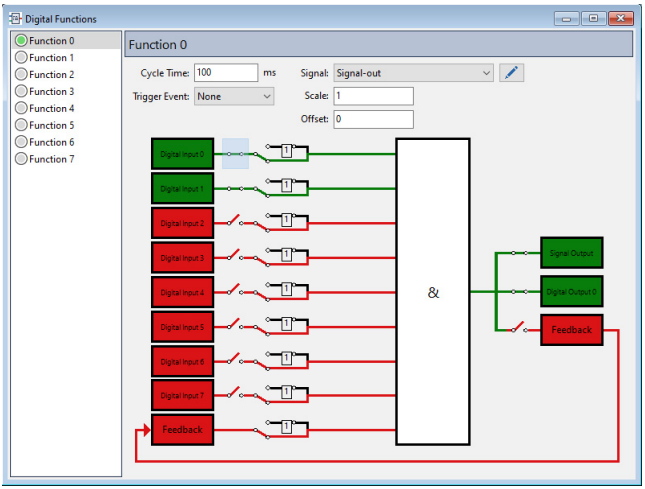

Figure 24: AND function (white box)

7. Click on **Export** and **Into Symbols File...**.
8. Edit the **File Name** (e.g. `Example-x.sym`).
9. Select the **Direction Reverse** option.

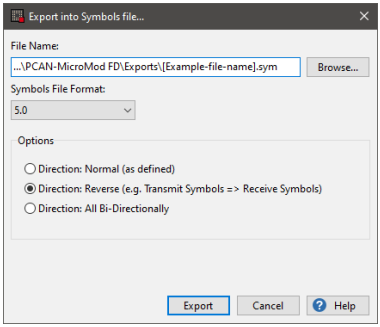

Figure 25: Export into Symbols file

10. Confirm with **Export** to create the Symbols file.
11. Click on the **Send Configuration** toolbar button.
12. Select the module and click **Send**.

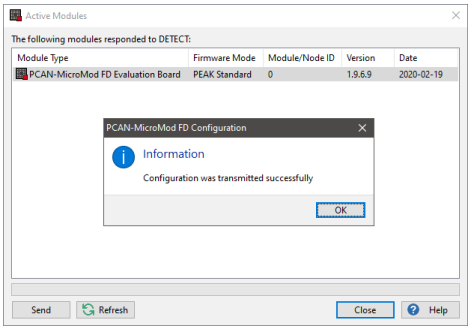

Figure 26: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Create an empty project and establish a connection to our CAN bus.
3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.

4. Right mouse-click on that Symbols file and select **Apply**.

   You should receive CAN messages with the **CAN ID 100h**.

Do the following on the PCAN-MicroMod FD Evaluation Board:

1. Activate the **Digital Input 1** switch (e.g. with a small screwdriver).

   The **Di0** LED should light up.The **Do0** LED should not light up.

   In the **Receive / Transmit** window of the PCAN-Explorer 6, the **Signal-out** value in the **Data** column is **0**.

2. Activate the **Digital Input 2** switch.

   The **Di1** LEDs should light up.The **Do0** LED should light up.

   The **Signal-out** value in the **Data** column is **1**.

3. Deactivate the **Digital Input 1** switch.

   The **Di0** and **Do0** LEDs should not light up anymore because both Digital Inputs are needed.

   The **Signal-out** value in the **Data** column is **0**.

   By using the **&** Logic Gate Function**, Digital Input 1** and **Digital Input 2** on the Evaluation Board must be activated so that the **Do0** LED lights up.

2.4.3 Example 5: Digital Function (≥ 1, “OR”)

1. Proceed the steps in chapter 2.4.1.
2. Open the **Digital Functions** service.
3. Close the switches next to **Digital Input 0**, **Digital Input1**, **Signal Output**, and **Digital Output 0**.

   The red colored turns green.
4. In the **Signal** drop-down menu, select **Signal-out** for **Function 0**.
5. Select a **Cycle Time** of **100 ms**.
6. Click on the white box and set ≥ **1**.

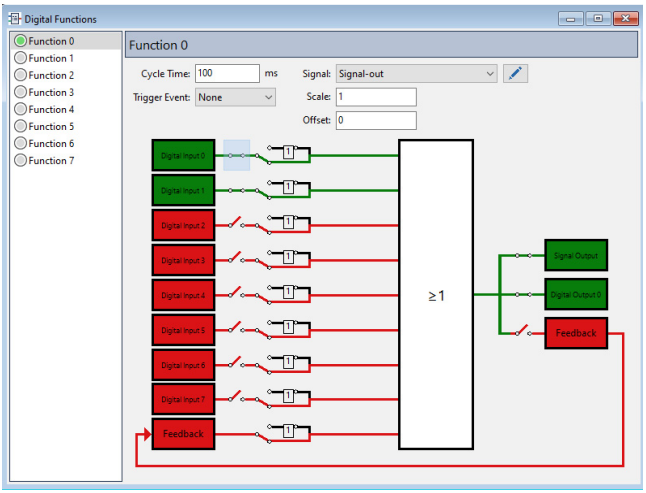

Figure 27: OR function (white box)

7. Click on **Export** and **Into Symbols File...**.
8. Edit the **File Name** (e.g. `Example-x.sym`).
9. Select the **Direction Reverse** option.

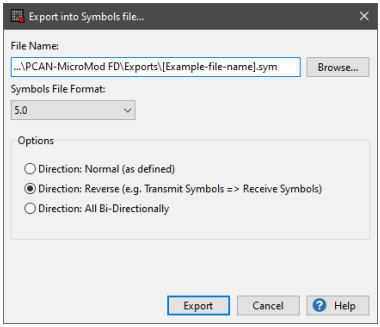

Figure 28: Export into Symbols file

10. Confirm with **Export** to create the Symbols file.
11. Click on the **Send Configuration** toolbar button.
12. Select the module and click **Send**.

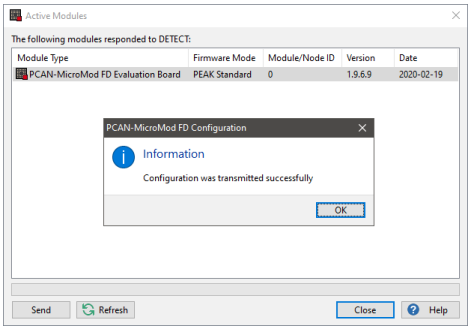

Figure 29: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Open an empty project and establish a connection to the CAN bus.
3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.

4. Right mouse-click on that Symbols file and select **Apply**.

   You should receive CAN messages with the **CAN ID 100h**.

Do the following on the PCAN-MicroMod FD Evaluation Board:

1. Activate the **Digital Input 1** switch (e.g. with a small screwdriver) on the Evaluation Board.

   The **Di0** and **Do0** LEDs should still light up.

   In the **Receive / Transmit** window of the PCAN-Explorer 6, the **Data** of **Signal-out** is **1**.

2. Activate the **Digital Input 2** switch.

   The **Di1** LED should light up. The **Di0** and **Do0** LEDs should still light up.

   The **Signal-out** value in the **Data** column is **1**.

3. Deactivate the **Digital Input 1** switch.

   The **Di0** and **Do0** LEDs no longer lights up.

   The **Signal-out** value in the **Data** column is **1**.

4. Deactivate the **Digital Input 2** switch.

   The **Di1** and **Do0** LEDs should not light up anymore.

   The **Signal-out** value in the **Data** column is **0**.

   By using the **OR** Logic Gate Function**, Digital Input 1** and/or **Digital Input 2** on the Evaluation Board must be activated so that the **Do0** LED lights up.

2.4.4 Example 6: Digital Function (RS Flip-Flop; SET, RESET)

1. Proceed the steps in chapter 2.4.1.
2. Open the **Digital Functions** service.
3. Close the switches next to **Digital Input 0**, **Digital Input1**, **Signal Output**, and **Digital Output 0**.

   The red colored turns green.
4. In the **Signal** drop-down menu, select **Signal-out** for **Function 0**.
5. Set the **Cycle Time** of **100 ms**.
6. Click on the white box and set **RS Flipflop**.

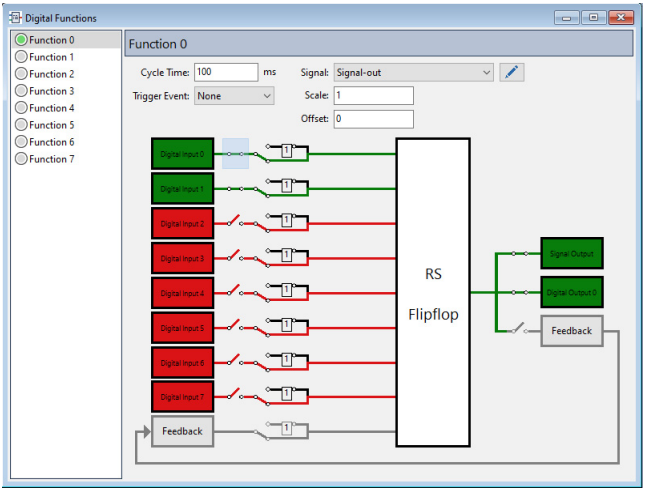

Figure 30: RS Flipflop function (white box)

7. Click on **Export** and **Into Symbols File...**.
8. Edit the **File Name** (e.g. `Example-x.sym`).
9. Select the **Direction Reverse** option.

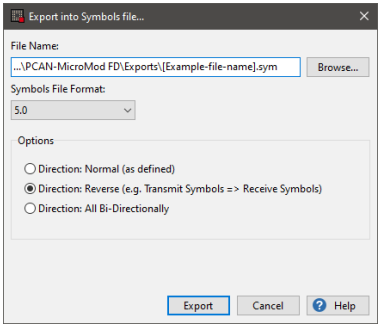

Figure 31: Export into Symbols file

10. Confirm with **Export** to create the Symbols file.
11. Click on the **Send Configuration** toolbar button.
12. Select the module and click **Send**.

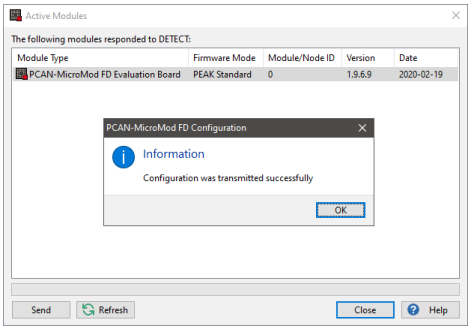

Figure 32: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Open an empty project and establish a connection to the CAN bus.
3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.

4. Right mouse-click on that Symbols file and select **Apply**.

   You should receive the CAN message with the **CAN ID 100h**.

Do the following on the PCAN-MicroMod FD Evaluation Board:

1. **SET**: Activate the **Digital Input 1** switch (e.g. with a small screwdriver) on the Evaluation Board.

   The **Di0** and **Do0** LEDs should light up.

   In the **Receive / Transmit** window of the PCAN-Explorer 6, **Signal-out** in the **Data** column is **1**.

2. Deactivate the **Digital Input 1** switch.

   The **Di0** should not light up anymore.

   The **Signal-out** value remains **1**.

3. **RESET**: Activate the **Digital Input 2** switch.

   The **Di1** LED should light up and the **Do0** LED should not light up anymore.

   The **Signal-out** value in the **Data** column is **0**.

   By using the **RS Flipflop** Logic Gate Function**,** the Digital Input 1 switch represents the **SET** and the Digital Input 2 switch represents the **RESET**.

   When SET=TRUE and RESET=FALSE the output is TRUE.

   When SET=FALSE and RESET=TRUE the output is FALSE.

   Otherwise, the **Do0** LED stays unchanged.

2.4.5 Example 7: Digital Function (Feedback)

1. Proceed the steps in chapter 2.4.1.
2. Open the **Digital Functions** service.
3. On the left side, activate the **Digital Input 0** and **Digital Input 1** switches.
4. Activate the Inverter by clicking on the **Feedback** switch.

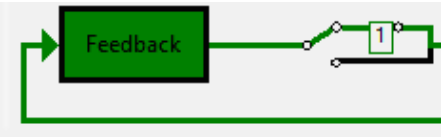

Figure 33: Enabled **Inverter** for the **Feedback** switch

This inverts the **Feedback** value of the enabled **Digital Inputs**.

5. On the right side, activate on the **Signal Output**, **Digital Output 0**, and **Feedback** switches.

   The red colored turns green.

6. In the **Signal** drop-down menu, select **Signal-out** for **Function 0**.
7. Set the **Cycle Time** to **100 ms**.
8. Click on the white box and set **&**.

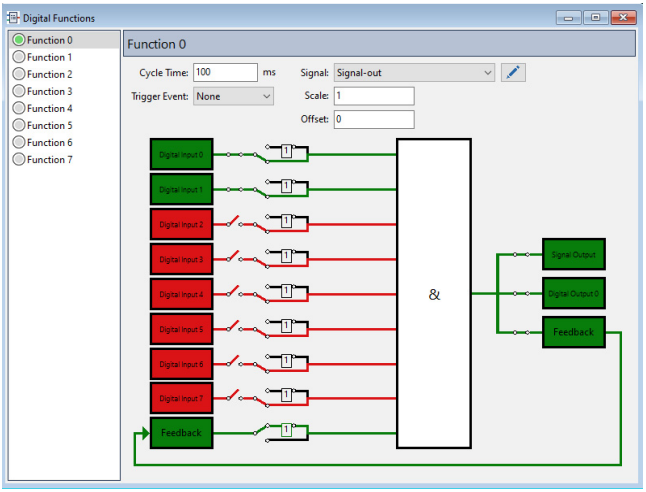

Figure 34: AND (white box) with Feedback function

9. Click on **Export** and **Into Symbols File...**.
10. Edit the **File Name** (e.g. `Example-x.sym`).
11. Select the **Direction Reverse** option.

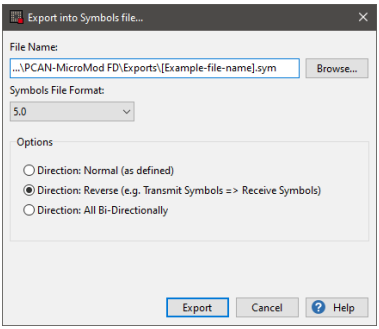

Figure 35: Export into Symbols file

12. Confirm with **Export** to create the Symbols file.
13. Click on the **Send Configuration** toolbar button.

14. Select the module and click **Send**.

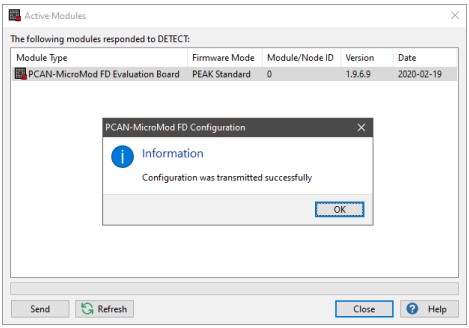

Figure 36: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the software PCAN-Explorer 6.
2. Open an empty project and establish a connection to the CAN bus.
3. In the Project Manager, click on **Add** and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select **Apply**.
5. You should receive CAN messages with the **CAN ID 100h**.

See the following on the PCAN-MicroMod FD Evaluation Board:

1. Activate the **Digital Input 1** and **2** switches (e.g. with a small screwdriver) on the Evaluation Board.

   The **Di0** and **Di1** LEDs light up. The **Do0** LED should flash.

   In the **Receive / Transmit** window, the **Data** of **Signal-out** toggles between **0** and **1**.

2. Deactivate the **Digital Input 1** switch.

   The **Di0** LED no longer lights up and the **Do0** LED should not flash anymore.

By the **& Logic Gate Function,** both Digital Inputs on the Evaluation Board must be activated. By inverting the feedback value the state changes to True and False and triggers the blinking of the **Do0** LED.

2.5 Examples 8-13: Functions

2.5.1 First Steps for Examples 8 to 10

1. Open the PCAN-MicroMod FD Configuration software.
2. Click on **New Configuration**.
3. Select the following options:
   - PCAN-MicroMod FD Evaluation Board
   - **Protocol**: CAN FD
   - **Bit Rate Preset**: SAE J2284-4 (500k/2M)
   - **Module ID**: make sure that this number is equal to the selected **Module ID** of the used PCAN-MicroMod FD Evaluation Board.

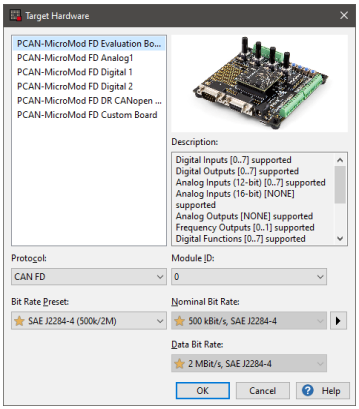

Figure 37: Target Hardware window

4. Confirm the settings with **OK**.
5. Add 3 new signals by clicking on **Add new Signal** in the **Signals** sidebar.

6. Rename the signals to **Signal-in0**, **Signal-in1,** and **Signal-out**.

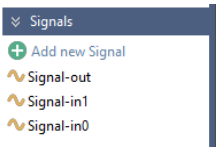

Figure 38: Signals for this example

7. Go to the **Symbols** service.
8. Right mouse-click on **Receive Symbols** and select **Add Symbol**.
9. Rename the **Receive Symbols** to **receive0** and **receive1**.
10. Edit the CAN IDs to **100h** and **101h**.
11. Right mouse-click on **Transmit Symbols** and select **Add Symbol**.
12. Rename the transmit symbol to **transmit0**.
13. Edit the **CAN ID** to **500h** and the **Send Period** to **100 ms**.
14. Perform a right mouse-click on the **transmit0** symbol and select **Add Variable**.

    The **Signals** dialog box opens.
15. Select the **Signal-out** signal and confirm with **OK**.
16. Add **Signal-in0** to **receive0** and **Signal-in1** to **receive1**.
17. Click on the **Signal-in0** variable and edit the **Length** to **16 bits**.
18. Repeat the previous step with **Signal-in1** and **Signal-out**.

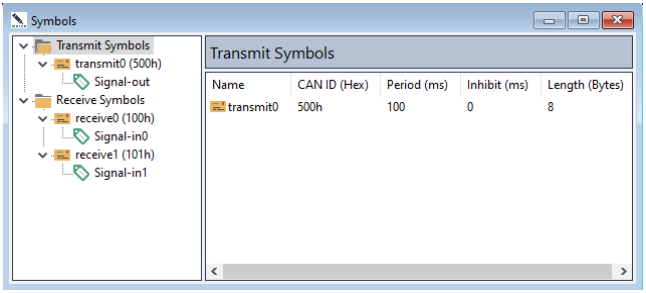

Figure 39: Symbols for this example

19. Click on the **Connect** toolbar button and select your available PCAN hardware (e.g PCAN-USB FD).

    Consider the settings in **step 3**.

Now continue with the corresponding examples (8-10):

- Example 8: Function (AND)
- Example 9: Function (OR)
- Example 10: Function (RS Flip-Flop)

2.5.2 Example 8: Function (AND)

1. Proceed the steps in chapter 2.5.1.
2. Open the **Functions** service.
3. Select **Function 0** in the left column.
4. Select **AND** in the **Type** drop-down menu and set a **Cycle Time** of **100 ms**.
5. Right mouse click on **Input 1** and click on the **Select Signal...** in the context menu entry.
6. Select the **Signal-in0** signal.
7. Repeat the previous two steps with **Input 2** and **Signal-in1**.
8. Edit the **Threshold 1** list entry to **20**, the **Threshold 2** to **40**.
9. Right mouse click on **Output 1** to open the context menu.
10. Select the **Signal-out** signal.

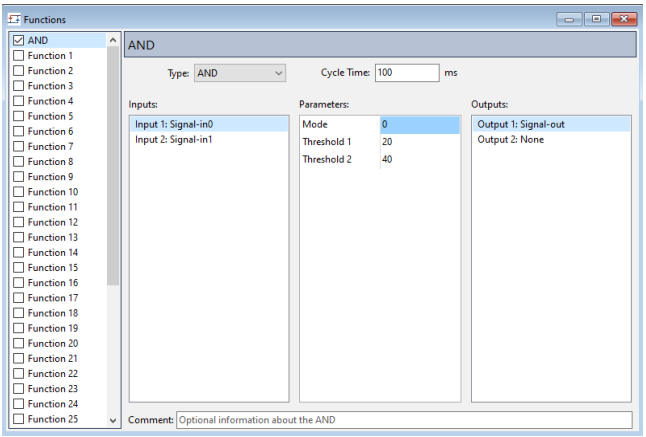

Figure 40: AND function

11. Click on **Export** and **Into Symbols File...**.
12. Edit the **File Name** (e.g. `Example-x.sym`).

13. Select the **Direction Reverse** option.

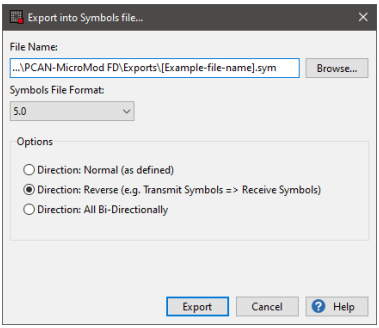

Figure 41: Export into Symbols file

14. Confirm with **Export** to create the Symbols file.
15. Click on the **Send Configuration** toolbar button.
16. Select the module and click **Send**.

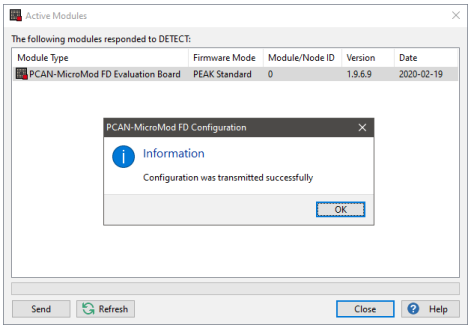

Figure 42: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Open an empty project and establish a connection to the CAN bus.

3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select **Apply**

   You should receive the CAN message with the **CAN ID 500h**.
5. In the **Receive / Transmit** window, send CAN messages with the CAN IDs **100h** and **101h**. For example:

   - 100h: 15
     Signal-out value remains 0.
   - 101h: 45
     Signal-out value remains 0.
   - 100h: 25
     Signal-out value changes to 1.
6. The **Data** of **Signal-out** should be only **1** when the value of the CAN message **100h** is greater than **Threshold 1 (20)** <u>and</u> the CAN message **101h** is greater than **Threshold 2 (40)**.

   Otherwise, **Signal-out** value in the **Data** column is set to **0.**

2.5.3 Example 9: Function (OR)

1. Proceed the steps in chapter 2.5.1.
2. Open the **Functions** service.
3. Select **Function 0** in the left column.
4. Select **OR** in the **Type** drop-down menu and set a **Cycle Time** of **100 ms**.
5. Right mouse click on **Input 1** and click on the **Select Signal...** in the context menu entry.
6. Select the **Signal-in0** signal.
7. Repeat the previous two steps with **Input 2** and **Signal-in1**.
8. Edit the **Threshold 1** list entry to **20**, the **Threshold 2** to **40**.
9. Right mouse click on **Output 1** to open the context menu.
10. Select the **Signal-out** signal.

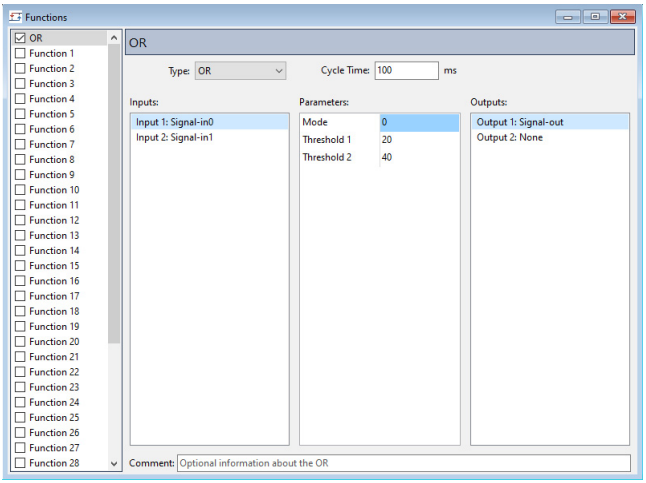

Figure 43: OR function

11. Click on **Export** and **Into Symbols File...**.

12. Edit the **File Name** (e.g. `Example-x.sym`).
13. Select the **Direction Reverse** option.

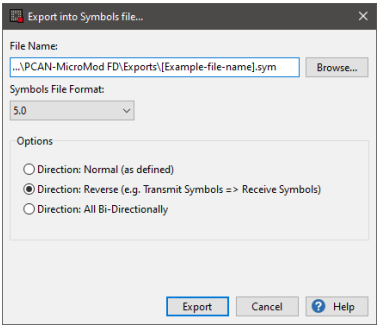

Figure 44: Export into Symbols file

14. Confirm with **Export** to create the Symbols file.
15. Click on the **Send Configuration** toolbar button.
16. Select the module and click on the **Send** button.

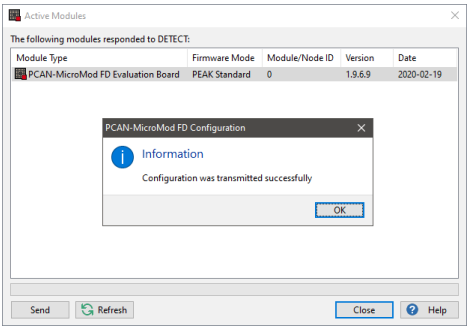

Figure 45: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Open an empty project and establish a connection to the CAN bus.
3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select **Apply**.

   You should receive the CAN message with the **CAN ID 500h**.
5. In the **Receive / Transmit** window, define CAN messages **100h** and **101h**. For example:

   - 100h: 15
     Signal-out value remains 0.
   - 101h: 45
     Signal-out value changes to 1.
6. The **Signal-out** value in the **Data** column should be **1** when the value of the CAN message **100h** is greater than **Threshold 1 (20)** <u>or</u> the CAN message **101h** is greater than **Threshold 2 (40)**.

   Otherwise, **Signal-out** value in the **Data** column is set to **0**.

2.5.4 Example 10: Function (RS Flip-Flop)

1. Proceed the steps in chapter 2.5.1.
2. Open the **Functions** service.
3. Select **Function 0** in the left column.
4. Select **RS Flip-Flop** in the **Type** drop-down menu and set a **Cycle Time** of **100 ms**.
5. Right mouse click on **Input 1** and click on the **Select Signal...** in the context menu entry.
6. Select the **Signal-in0** signal.
7. Repeat the previous two steps with **Input 2** and **Signal-in1**.
8. Right mouse click on **Output 1** to open the context menu.
9. Select the **Signal-out** signal.

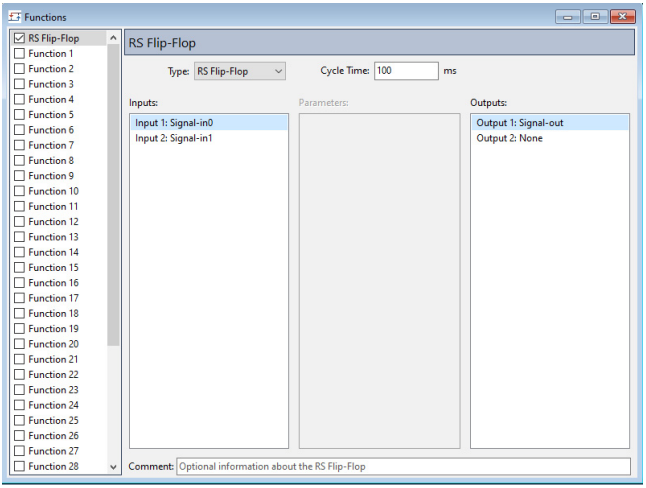

Figure 46: RS FlipFlop function

10. Click on **Export** and **Into Symbols File...**.
11. Edit the **File Name** (e.g. `Example-x.sym`).

12. Select the **Direction Reverse** option.

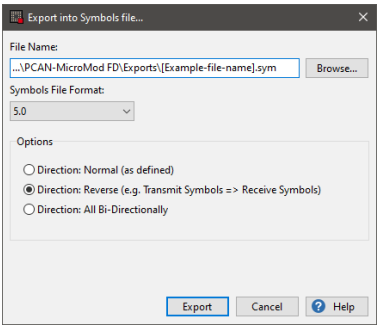

Figure 47: Export into Symbols file

13. Confirm with **Export** to create the Symbols file.
14. Click on the **Send Configuration** toolbar button.
15. Select the module and click on the **Send** button.

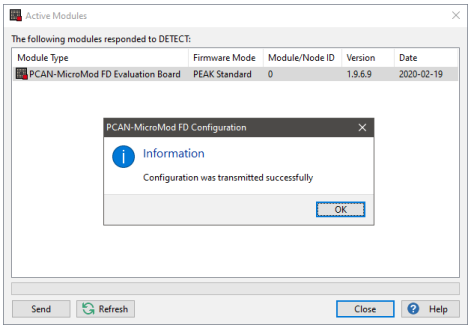

Figure 48: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Open an empty project and establish a connection to the CAN bus.

3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select **Apply**.

   You should receive the CAN message with the **CAN ID 500h**.
5. In the **Receive / Transmit** window, define transmit CAN messages with the CAN IDs **100h** and **101h** with different values:

   100h: 0
   100h: 10
   101h: 0
   101h: 10
6. Send this messages in the following order:

   (1) 100h (10) and 101h (0)

   (2) 100h (0) and 101h (10)
7. The received CAN message **500h** should be **0** by default, **1** after the 1st step, and **0** after the 2nd step.

2.5.5 First Steps for Examples 11 to 13

1. Open the PCAN-MicroMod FD Configuration software.
2. Click on **New Configuration**.
3. Select the following options:
   - PCAN-MicroMod FD Evaluation Board
   - **Protocol**: CAN FD
   - **Bit Rate Preset**: SAE J2284-4 (500k/2M)
   - **Module ID**: make sure that this number is equal to the selected **Module ID** of the used PCAN-MicroMod FD Evaluation Board.

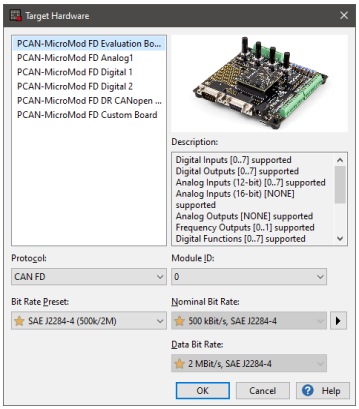

Figure 49: Target Hardware window

4. Confirm the settings with **OK**.
5. Click on the **Connect** toolbar button and select your available PCAN hardware (e.g PCAN-USB FD).
6. Consider the settings in step 3.
7. Add 2 new signals by clicking on **Add new Signal** in the **Signals** sidebar.

8. Rename the signals to **Signal-in** and **Signal-out**.

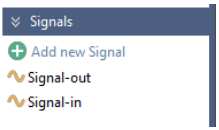

Figure 50: Signals for this example

9. Go to the **Symbols** service.
10. Right mouse-click on **Receive Symbols** and select **Add Symbol**.
11. Rename the **Receive Symbol** to **receive0**.
12. Edit the CAN IDs to **100h**.
13. Right mouse-click on **Transmit Symbols** and select **Add Symbol**.
14. Rename the **Transmit Symbol** to **transmit0**.
15. Edit the CAN ID to **500h** and the **Send Period** to **100 ms**.
16. Perform a right mouse-click on the **transmit0** symbol and select **Add Variable**.

    The **Signals** dialog box opens.
17. Select the **Signal-out** signal and confirm with **OK**.
18. Add **Signal-in** to the **receive0** symbol.
19. Click on the **Signal-out** variable and edit the **Length** to **16 bits**.
20. Repeat the previous step with **Signal-in**.

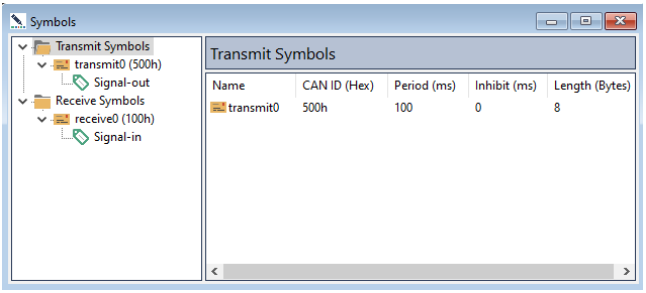

Figure 51: Symbols for this example

Now continue with the corresponding examples (11-13):

- Example 11: Function (Monoflop)
- Example 12: Function (Hysteresis)
- Example 13: Function (CAN Trigger)

2.5.6 Example 11: Function (Monoflop)

1. Proceed the steps in chapter 2.5.5.
2. Open the **Functions** service.
3. Select **Function 0** in the left column.
4. Select **Monoflop** in the **Type** drop-down menu and set a **Cycle Time** of **100 ms**.
5. Right mouse click on **Input** to open the context menu.
6. Select the **Signal-in** signal.
7. Edit the Parameters:

   Time: 3000
   Threshold: 350
   Mode: 0
   Active Output Value: 400
   Inactive Output Value: 300

8. Right mouse click on **Output** to open the context menu.
9. Select the **Signal-out** signal.

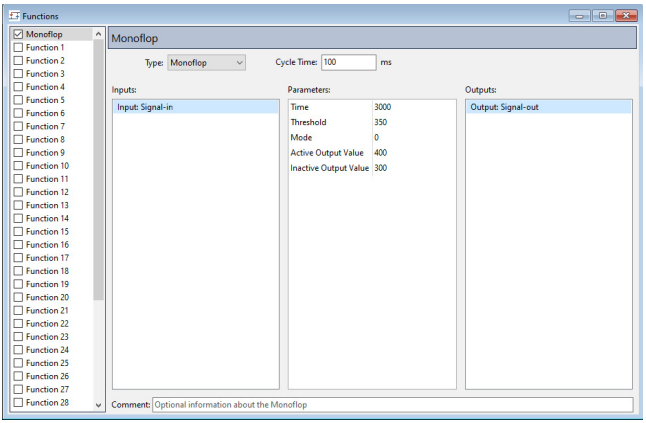

Figure 52: Monoflop function

10. Click on **Export** and **Into Symbols File...**.
11. Edit the **File Name** (e.g. `Example-x.sym`).
12. Select the **Direction Reverse** option.

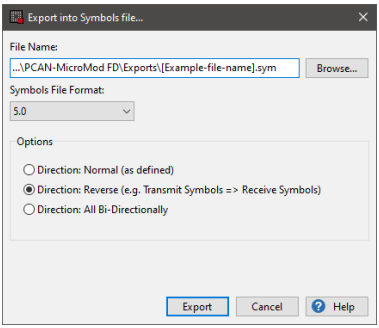

Figure 53: Export into Symbols file

13. Confirm with **Export** to create the Symbols file.
14. Click on the **Send Configuration** toolbar button.
15. Select the module and click on the **Send** button.

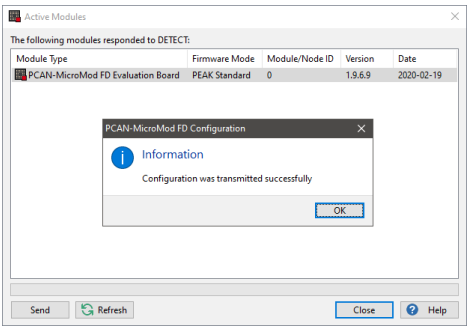

Figure 54: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.

2. Open an empty project and establish a connection to the CAN bus.
3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select **Apply**.
5. In the **Receive / Transmit** window, define transmit CAN messages with the CAN IDs **100h** with different values:

   100h: 0
   100h: 350

6. Send a CAN message with a minimum value of **350** (**Threshold**).

   Signal-out should change to **400** immediately. If the value is less than 350, the value of **Signal-out** remains at **300**.

7. Send a CAN message with value **0**.
8. **Signal-out** should change to **300** after **3 seconds**.

   This is mode **0** (positive level trigger).

2.5.7 Example 12: Function (Hysteresis)

1. Proceed the steps in chapter 2.5.5.
2. Click on the **Signal-in** in the **Signals** sidebar.
3. In the **Properties** sidebar below, set a **Start-up** value of **40**.
4. Open the **Functions** service.
5. Select **Function 0** in the left column.
6. Select **Hysteresis** in the **Type** drop-down menu and set a **Cycle Time** of **100 ms**.
7. Right mouse click on **Input** to open the context menu.

   Select the **Signal-in** signal.
8. Edit the Parameters:

   Upper Border: 50
   Lower Border: 30
   High Output: 70
   Low Output: 10
   Initial Output: 5
9. Right mouse click on **Output** to open the context menu.
10. Select the **Signal-out** signal.

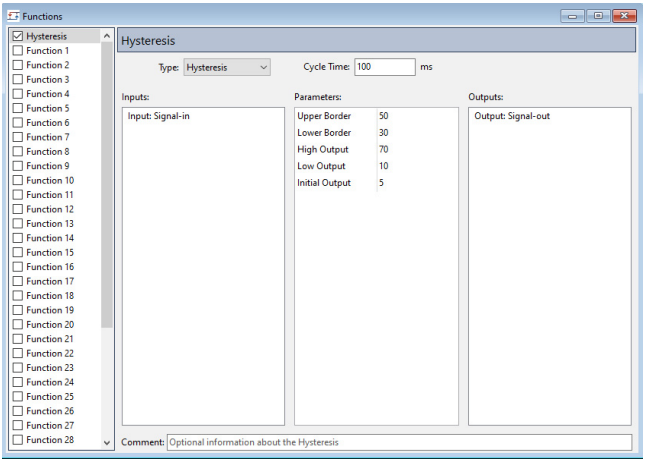

Figure 55: Hysteresis function

11. Click on **Export,** and **Into Symbols File....**
12. Edit the **File Name** (e.g. `Example-x.sym`).
13. Select the **Direction Reverse** option.

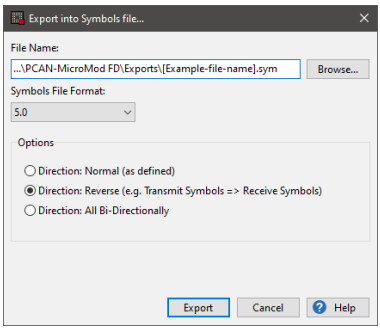

Figure 56: Export into Symbols file

14. Confirm with **Export** to create the Symbols file.
15. Click on the **Send Configuration** toolbar button.

16. Select the module and click on the **Send** button.

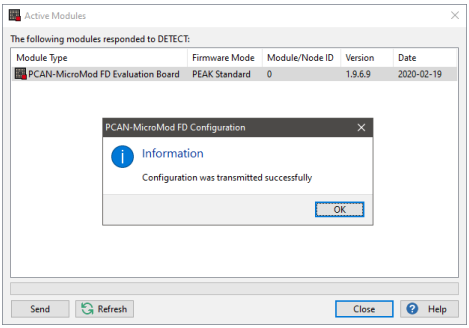

Figure 57: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Open an empty project and establish a connection to the CAN bus.
3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select **Apply**.

   You should receive the CAN message with the **CAN ID 500h**.
5. Define transmit CAN messages with the CAN IDs **100h** with different values:

   100h: 15
   100h: 25
   100h: 35
   100h: 55
   100h: 65
6. The value of the received CAN message (**500h**) should be **5** as this is the value for the **Initial Output**.

Start-up value **(40)** is between **Lower (30)** and **Upper Border (50)**.

7. Send a value smaller than **30** (**Lower Border**).

   The value of CAN ID 500h should be **10** (**Low Output**).

8. Send a value bigger than **50** (**Upper Border**).

   The value of CAN ID 500h should be **70** (**High Output**).

2.5.8 Example 13: Function (CAN Trigger)

1. Proceed the steps in chapter 2.5.5.
2. Go to the Symbols service.
3. Select the transmit symbol **500h** and edit the **Send Period** to **1000 ms**.
4. Open the **Functions** service.
5. Select **Function 0** in the left column.
6. Select **CAN Trigger** in the **Type** drop-down menu and set a **Cycle Time** of **100 ms**.
7. Right mouse click on **Input 1** to open the context menu.
8. Select the **Signal-in** signal.
9. Edit the following parameters:

   CAN ID: 500h
   Type: 0
   Mode: 5
   Threshold: 20
   Epsilon: 0

10. Right mouse click on **Output 1** to open the context menu.
11. Select the **Signal-out** signal.

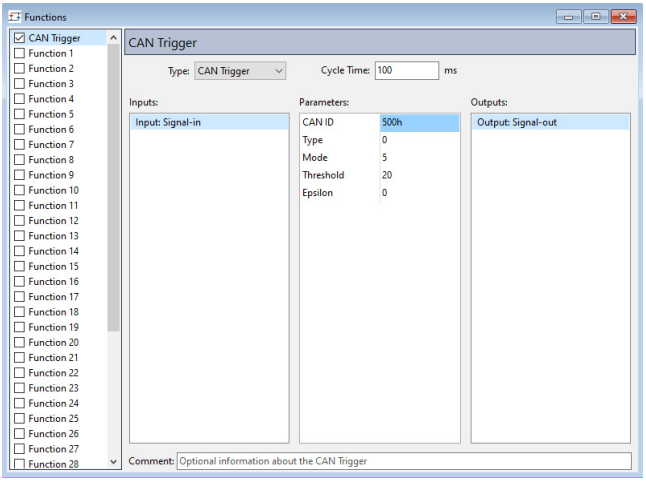

Figure 58: CAN Trigger function

12. Click on **Export** and **Into Symbols File...**.
13. Edit the **File Name** (e.g. `Example-x.sym`).
14. Select the **Direction Reverse** option.

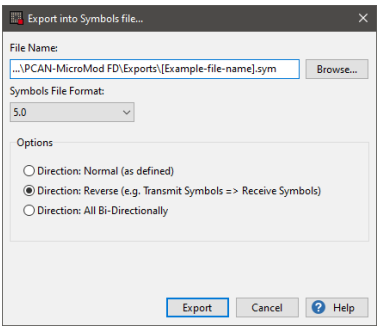

Figure 59: Export into Symbols file

15. Confirm with **Export** to create the Symbols file.
16. Click on the **Send Configuration** toolbar button.

17. Select the module and click on the **Send** button.

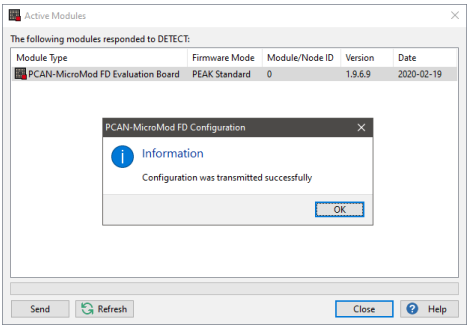

Figure 60: Active Modules window

Evaluation with the PCAN-Explorer 6:

1. Open the PCAN-Explorer 6 software.
2. Open an empty project and establish a connection to the CAN bus.
3. In the **Project Manager**, click on **Add** and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select **Apply**.

   The CAN message **500h** should be received each **1000 ms**.
5. Define transmit CAN messages with the CAN IDs **100h** with different values:

   100h: 0
   100h: 30
6. Send the CAN message **100h** with the **Signal-in** value of **30**.

   The CAN message **500h** will be received each **100 ms** because the value **30** is bigger than the **Threshold 20**.

   Mode 5 means that it becomes true when **Input > Threshold**.