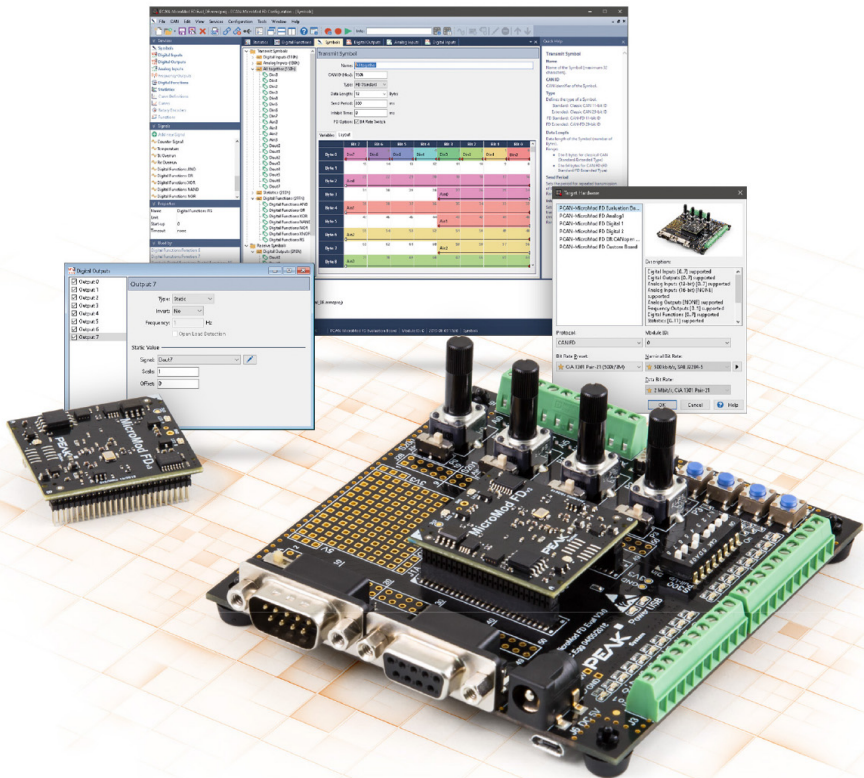


PCAN-MicroMod FD

Configuration Tutorial



Relevant products

Product Name	Part number
PCAN-MicroMod FD Evaluation Board	IPEH-003081
CAN FD interface of the PCAN series (e.g. PCAN-USB FD)	IPEH-004022
PCAN-MicroMod FD Configuration Software	-
PCAN-Explorer 6	IPES-006000
PCAN-View 4	-

Imprint

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PEAK-System Technik GmbH
Otto-Röhm-Straße 69
64293 Darmstadt
Germany

Phone: +49 6151 8173-20

Fax: +49 6151 8173-29

www.peak-system.com

info@peak-system.com

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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

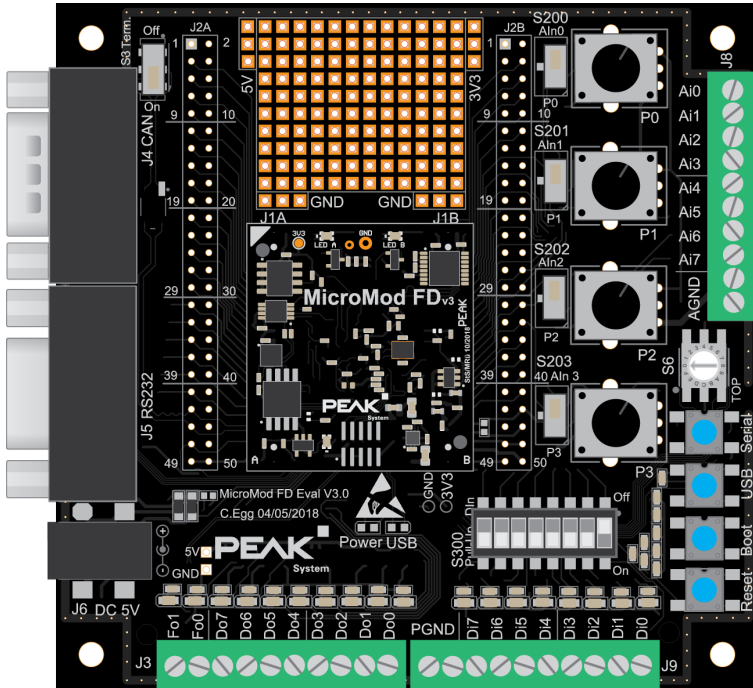
For the tutorial you need the following hardware and software:

- 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.

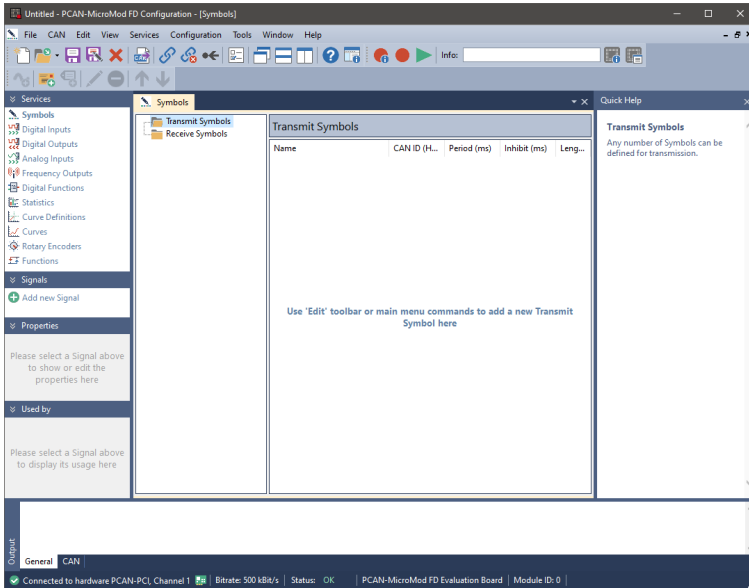
The configuration is done with a supplied Windows software which transfers the configuration data to the module via CAN.



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.



Tip: Use the Quick Help side window on the right to get 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.



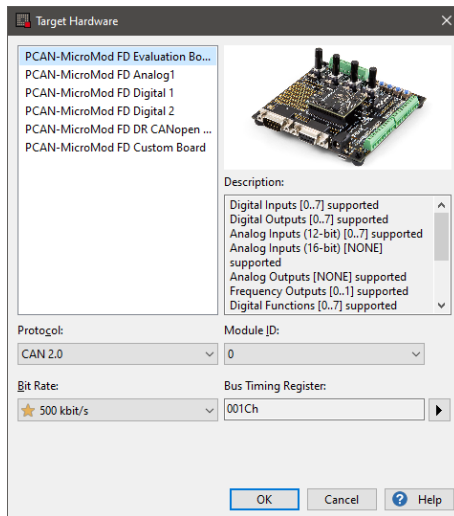
Note: The purchasable PCAN-Explorer 6 software is used to gain a better understanding or even required for the evaluation (e.g. Functions Service). The PCAN-Explorer 6 is not required for the configuration of PCAN-MicroMod FD products.





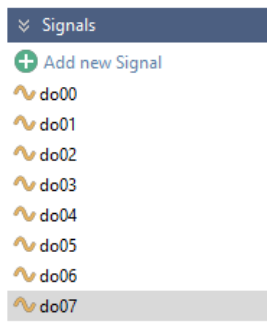
Tip: You can simply take note of the results of the respective example in this tutorial - without the PCAN-Explorer 6 software.


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.

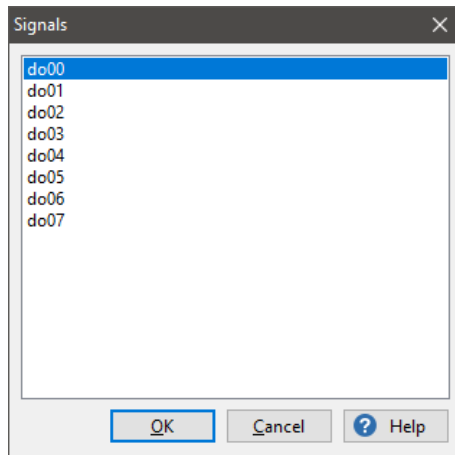


4. Open the  *Digital Outputs* service.
The *Digital Outputs* window appears.
5. Click on  *Add new Signal* in the Signals sidebar and add 8 new Signals.
6. Rename them to **do00 – do07**.

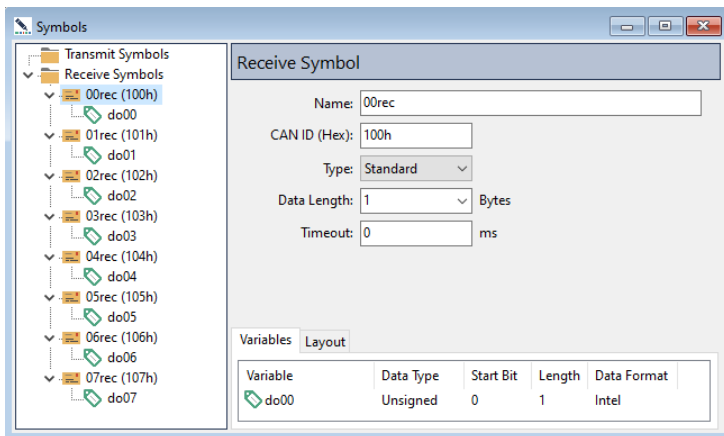



7. Go to the  *Symbols* service.
8. Add 8 *Receive Symbols*.
9. In the *Name* field of the *Receive Symbol* tab, rename the Symbols to **00rec - 07rec**.
10. Edit the CAN IDs **100h – 107h** in the *CAN ID (Hex)* field.
Set the *Data Length* of the Symbols **00rec – 07rec** to **1 Bytes**.

11. Perform a right mouse-click on the *00rec* symbol and select  *Add Variable*. The *Signals* dialog box opens.

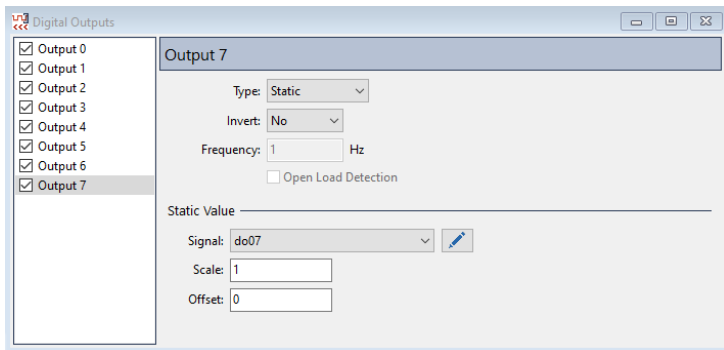



12. Select *do00*.
13. Do the same with the *01rec - 07rec* (*do01 - do07*) symbols.



14. In the  *Digital Outputs* window, activate the *Output 0* checkbox.
15. In the *Output* tab, select *do00* in the *Signal* drop-down menu.

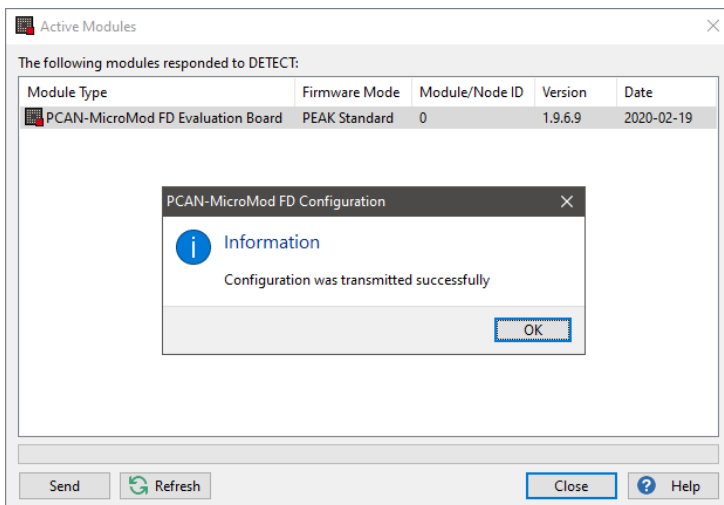
16. Do the same with the *do01* – *do07* signals and *Output 1* – *Output 7*.



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*.



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**.

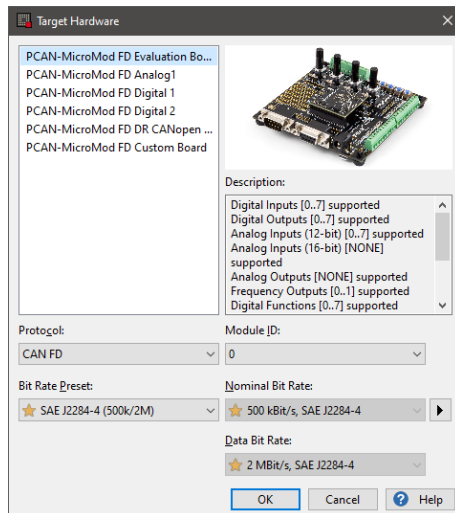
The *Data* value of **01** means the LED lights up. A *data* value of **00** means that the LED does not light up.

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.

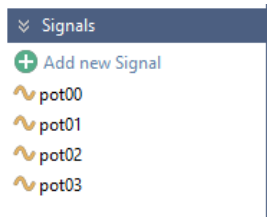
2.2 Example 2: Analog Inputs - Control LEDs via the 4 Potentiometers

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.



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

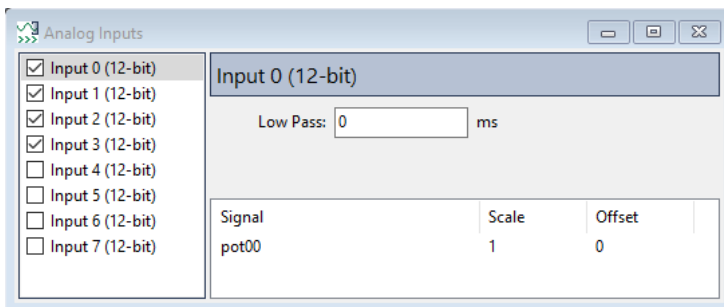
6. Rename the signals to **pot00 - pot03**.



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.



10. Open the  *Digital Outputs* service.

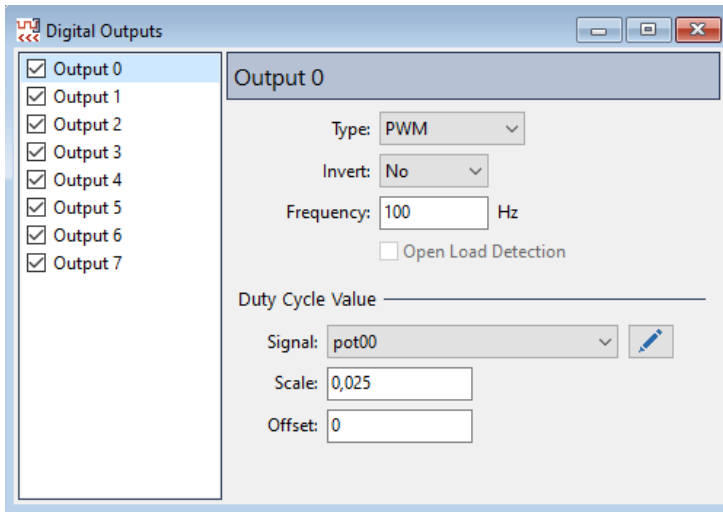
11. Activate the *Output 0 - Output 7* items.



12. Click on *Output 0*.

13. In the *Type* drop-down menu, select *PWM* and change the *Frequency* to *100 Hz*.

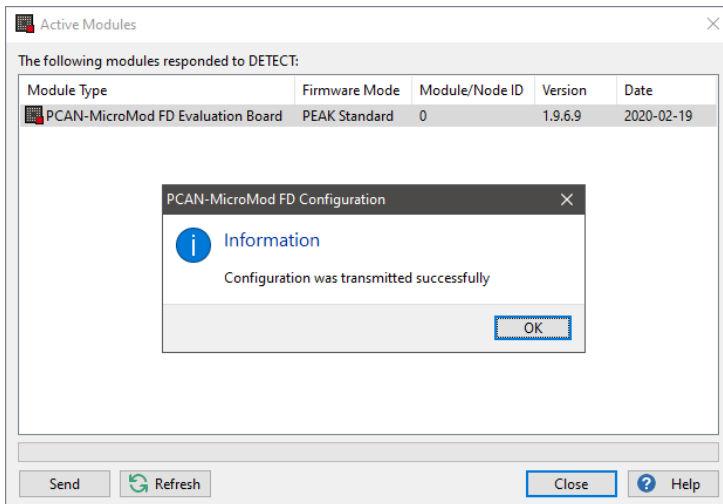
14. Do the same for *Output 1* to *Output 7*.

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**.



16. 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.
17. Click on  *Send Configuration*.

18. Select the module and click *Send*.



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.

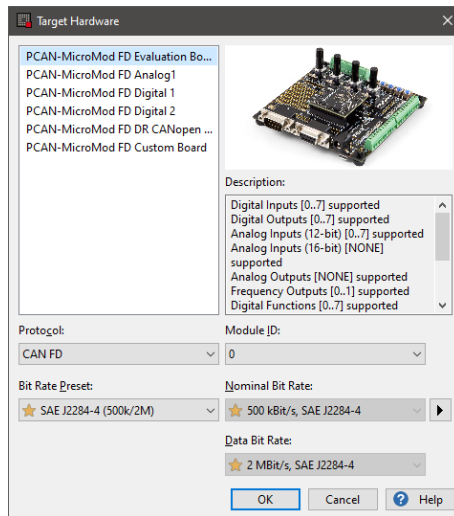
Which LEDs are influenced by which potentiometer (**P0 –P3**) depends on the selected assignment of the *pot00 – pot03* signals to the output items in the *Digital Output Service*.



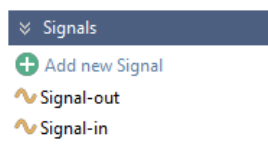
Tip: You can assign the signals as you wish. For example, it is also possible to select only one signal and thus switch all LEDs on or off via one CAN message. Try it out.

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.

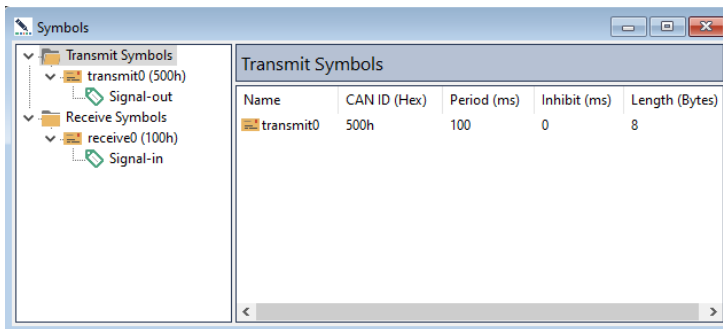


4. Confirm the settings with **OK**.
5. Add two signals by clicking on  *Add new Signal* in the *Signals* sidebar.
6. Rename the signals to **Signal-in** and **Signal-out**.



7. Open the  *Symbols* service.

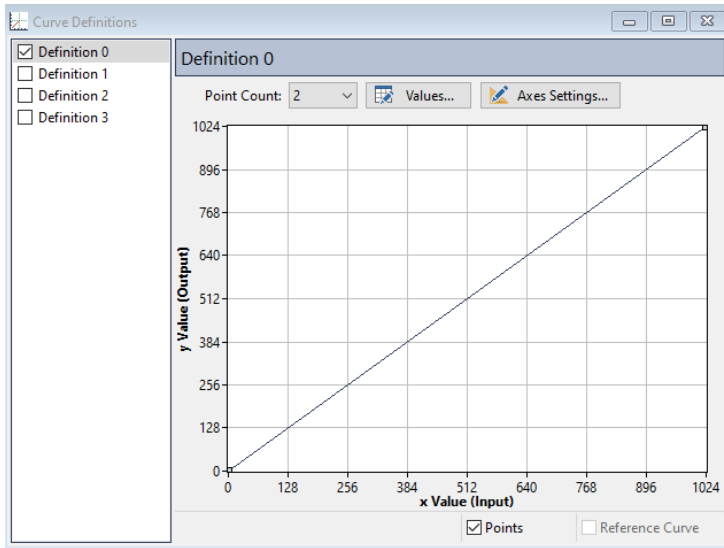
8. Add a symbol to the *Transmit Symbols* and *Receive Symbols*.
9. Rename the transmit symbol to **transmit0**, edit the *CAN ID* to **500h**, and set the *Send Period* to **100 ms**.
10. Rename the receive symbol to **receive0** and edit the *CAN ID* to **100h**.
11. Perform a right mouse-click on the *transmit0* symbol and select  *Add Variable*.
The *Signals* dialog box opens.
12. Select the *Signal-out* signal in the *Signals* dialog box and confirm with *OK*.
13. Add *Signal-in* to *receive0*.
14. Click on *Signal-out* and extend the *Length* to **16 bits**.
15. Do the same with *Signal-in*.



16. Open the  *Curve Definitions* service.

17. 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.

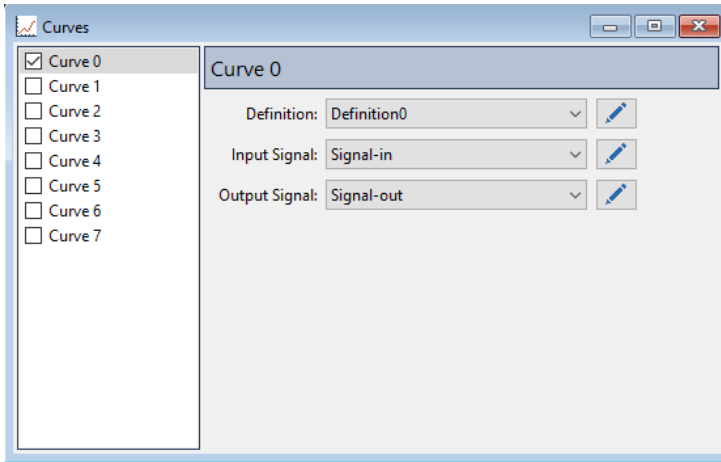



18. Open the  *Curves* services.

19. Activate *Curve 0* and select *Definition 0*.

20. For the *Input Signal*, select *Signal-in*.

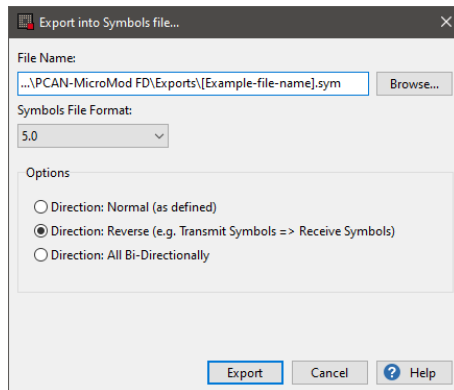
21. For the *Output Signal*, select *Signal-out*.




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

23. Edit the *File Name* (e.g. `Example-x.sym`).

24. Select the *Direction Reverse* option.

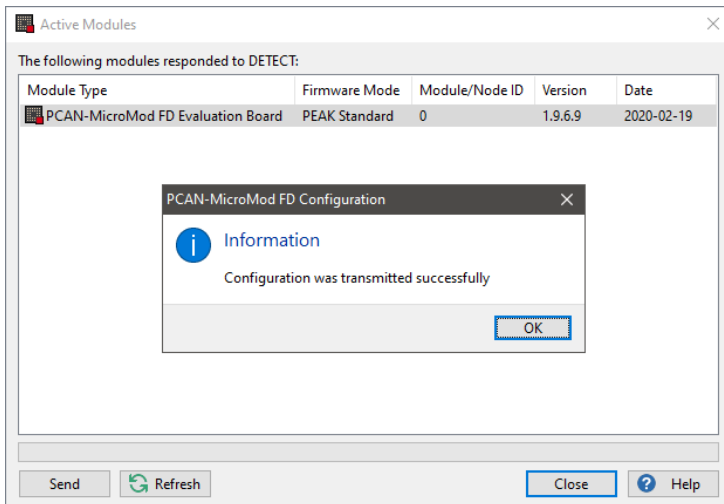


25. Confirm with *Export* to create the Symbols file.

26. 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.

27. Click on  *Send Configuration*.

28. Select the module and click *Send*.




Evaluation with the PCAN-Explorer 6:

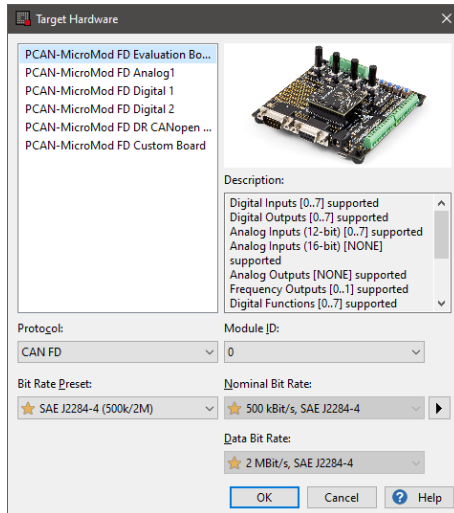
1. Open the PCAN-Explorer 6 software.
2. Create an empty project and establish a connection to our CAN bus.
3. In the *Project Manager*, click on *Add* and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select *Apply*.
5. You should receive CAN messages 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 to 7: Digital Functions

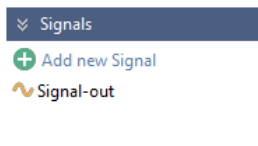
2.4.1 First Steps for Examples 4 to 7

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.




4. Confirm the settings with *OK*.
5. Click on the  *Connect* toolbar item and select your available PCAN hardware. 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**.




8. Open the  *Symbols* service.

9. Right mouse-click on *Transmit Symbols* and select  *Add Symbol*.

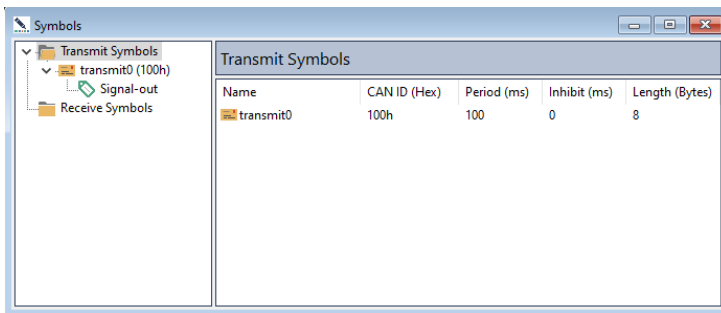
10. Rename the transmit symbol to **transmit0**.

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**.



Now continue with the corresponding examples (4 to 7):

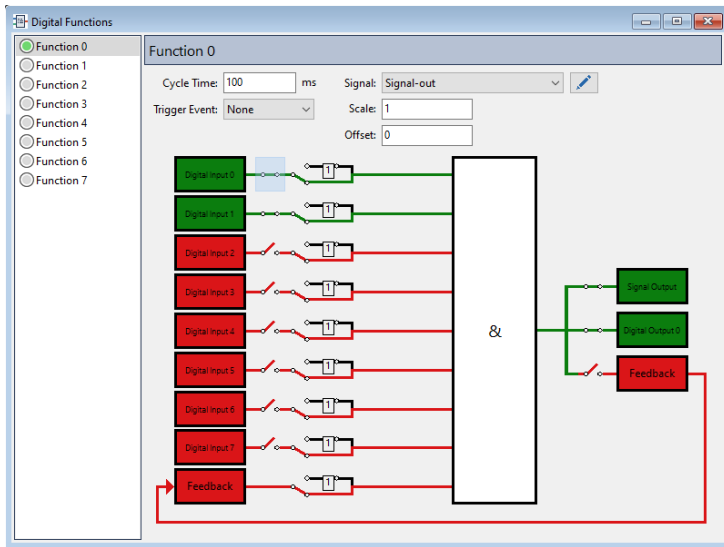
- *Example 4: Digital Function (&, “AND”)*
- *Example 5: Digital Function (≥ 1 , “OR”)*
- *Example 6: Digital Function (RS Flip-Flop; SET, RESET)*
- *Example 7: Digital Function (Feedback)*


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

1. Proceed the steps in chapter *First Steps for Examples 4 to 7*
2. Open the  *Digital Functions* service.
3. Close the switches next to *Digital Input 0*, *Digital Input1*, *Signal Output*, and *Digital Output 0*.

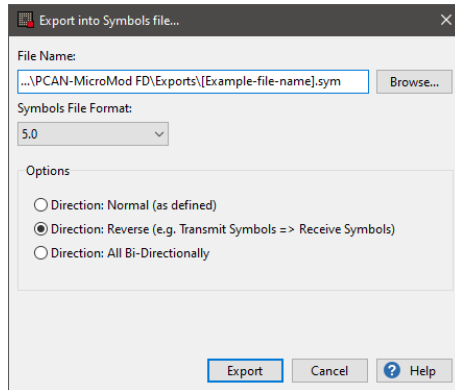
The red colored turns green.

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 **&**.



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

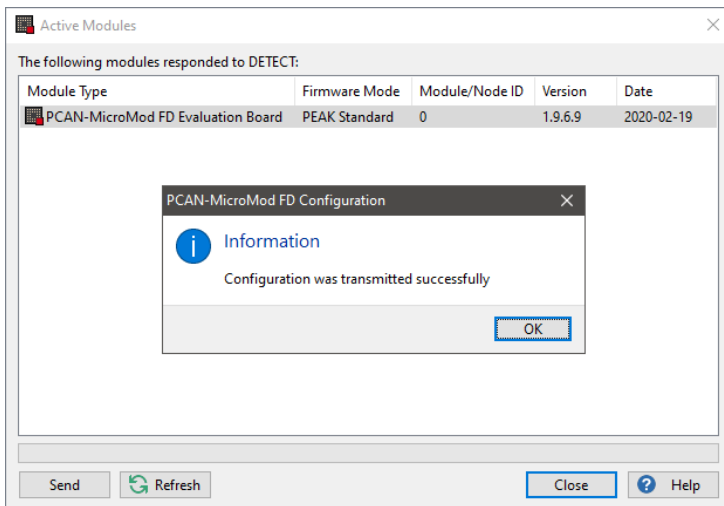
9. Select the *Direction Reverse* option.



10. Confirm with *Export* to create the Symbols file.

11. Click on ► *Send Configuration*.

12. Select the module and click *Send*.




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:

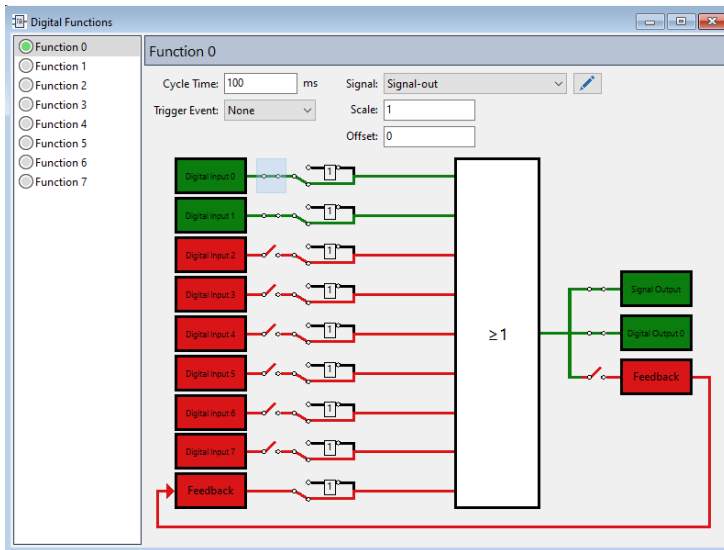
1. Activate the *Digital Input 1* switch (e.g. with a small screwdriver).
The **Di0** LED should light up. The **Do0** LED should not light up.
In the *Receive / Transmit* window of the PCAN-Explorer 6, the *Signal-out* value in the *Data* column is *0*.
2. Activate the *Digital Input 2* switch.
The **Di1** LED 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 *First Steps for Examples 4 to 7*
2. Open the  *Digital Functions* service.
3. Close the switches next to *Digital Input 0*, *Digital Input1*, *Signal Output*, and *Digital Output 0*.

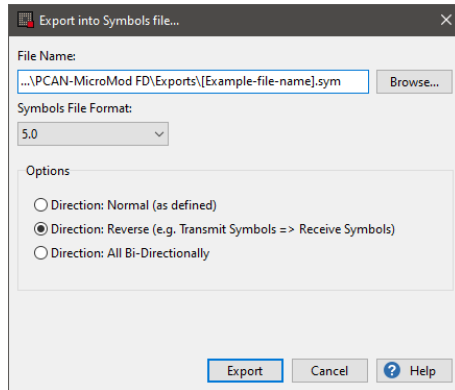
The red colored turns green.

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 ≥ 1 .



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

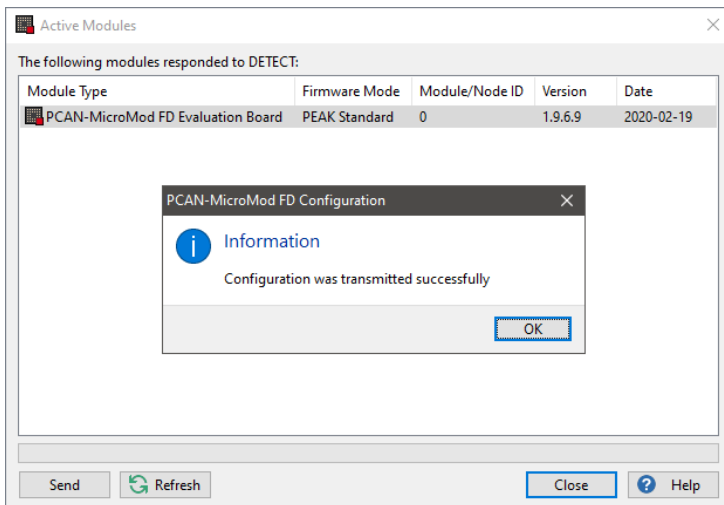
9. Select the *Direction Reverse* option.



10. Confirm with *Export* to create the Symbols file.

11. Click on ► *Send Configuration*.

12. Select the module and click *Send*.




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:

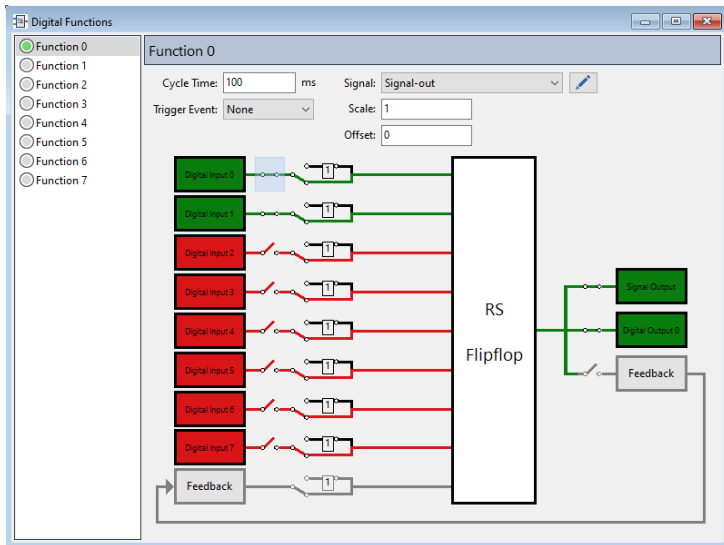
1. Activate the *Digital Input 1* switch (e.g. with a small screwdriver).
The **Di0** and **Do0** LED should still light up.
In the *Receive / Transmit* window of the PCAN-Explorer 6, the *Signal-out* value in the *Data* column is *1*.
2. Activate the *Digital Input 2* switch.
The **Di1** LEDs should light up. The **Di0** and **Do0** LED should still light up.
The *Signal-out* value in the *Data* column remains *1*.
3. Deactivate the *Digital Input 1* switch.
The **Di0** LED no longer lights up. **Di1** and **Do0** still lights up.
The *Signal-out* value in the *Data* column remains *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 *First Steps for Examples 4 to 7*
2. Open the  *Digital Functions* service.
3. Close the switches next to *Digital Input 0*, *Digital Input1*, *Signal Output*, and *Digital Output 0*.

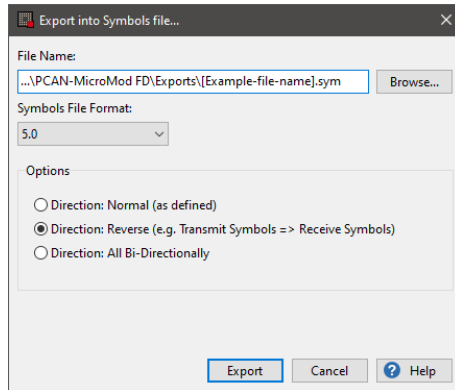
The red colored turns green.

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 *RS Flipflop*.



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

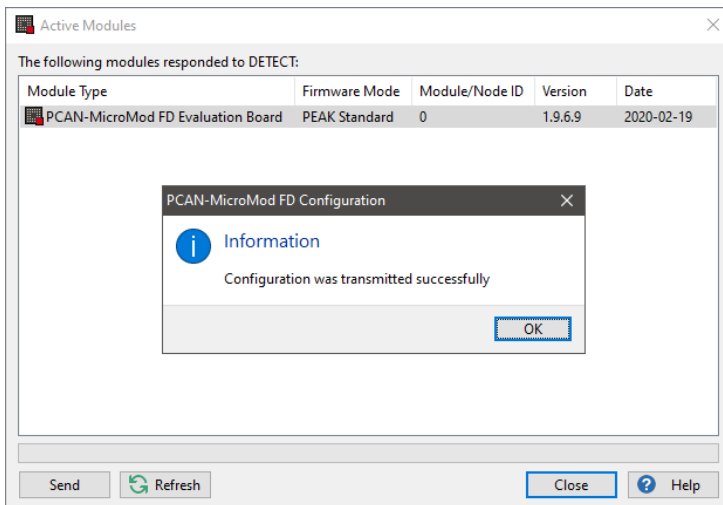
9. Select the *Direction Reverse* option.



10. Confirm with *Export* to create the Symbols file.

11. Click on ► *Send Configuration*.

12. Select the module and click *Send*.




Evaluation with the PCAN-Explorer 6:

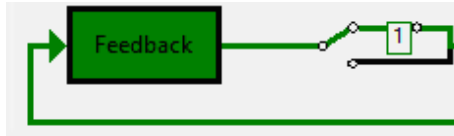
1. Open the PCAN-Explorer 6 software.
2. Create an empty project and establish a connection to our CAN bus.
3. In the *Project Manager*, click on *Add* and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select *Apply*.
You should receive CAN messages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

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

1. **SET:** Activate the *Digital Input 1* switch (e.g. with a small screwdriver).
The **Di0** and **Do0** LED should light up.
In the *Receive / Transmit* window of the PCAN-Explorer 6, the *Signal-out* value in the *Data* column is *1*.
2. Deactivate the *Digital Input 1* switch.
The **Di0** LED should not light up anymore.
The *Signal-out* value in the *Data* column remains *1*.
3. **RESET:** Activate the *Digital Input 2* switch.
The **Di1** LED should light up and the **Do0** should not light up anymore.
The *Signal-out* value in the *Data* column is *0*.
By using the *RS Flipflop Logic Gate Function*, *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 *First Steps for Examples 4 to 7*
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.

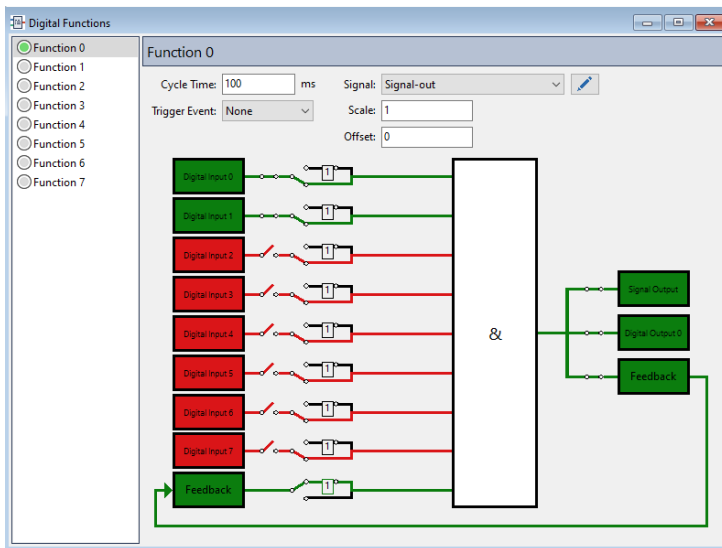



This inverts the *Feedback* value of the enabled *Digital Inputs*.

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

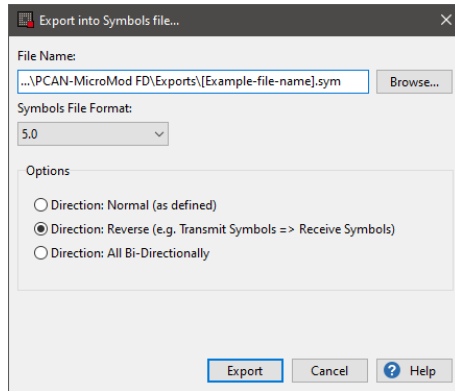
The red colored turns green.

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 **&**.

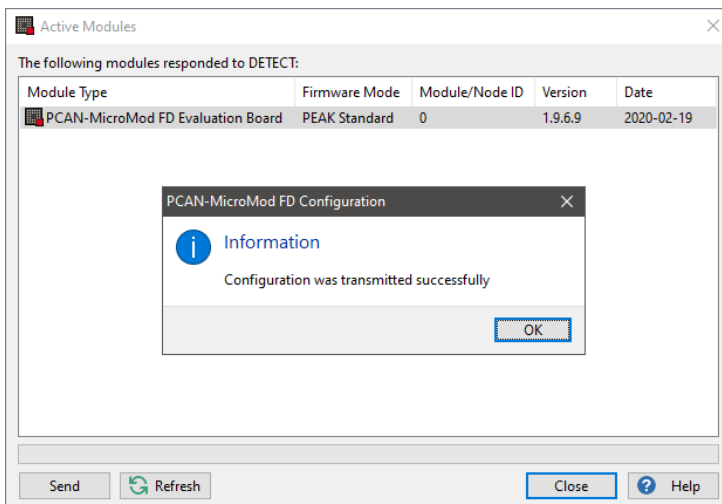


9. Click on  *Export and Into Symbols File....*

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



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



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*.

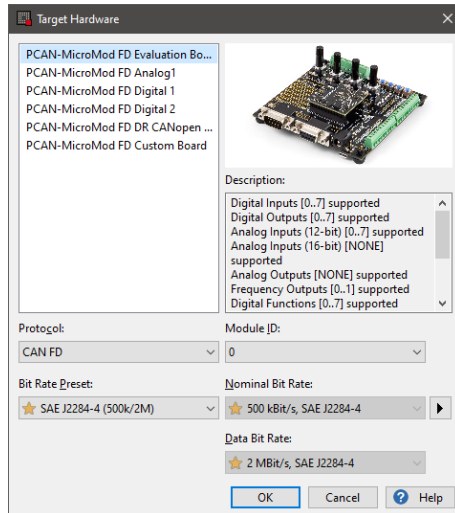
Do the following on the PCAN-MicroMod FD Evaluation Board:

1. Activate the *Digital Input 1* and *2* switches (e.g. with a small screwdriver).
The **Di0** and **Di1** LEDs light up. The **Do0** LED should flash.
In the *Receive / Transmit* window of the PCAN-Explorer 6, the *Signal-out* value in the *Data* column 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 using 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 to 13: Digital Functions

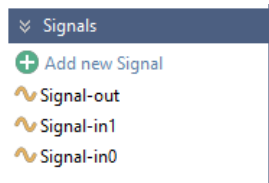
2.5.1 First Steps for Examples 8 to 10





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.



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

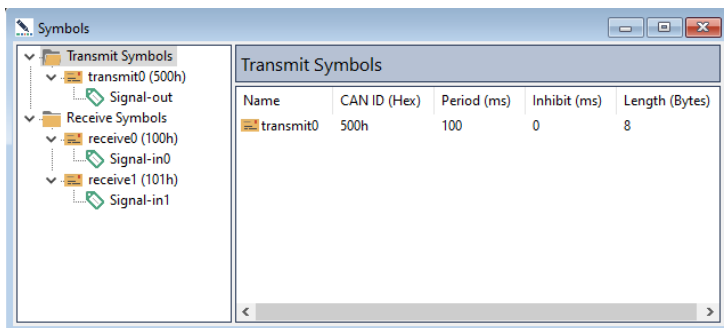
- Rename the signals to **Signal-in0**, **Signal-in1**, and **Signalout**.




- Open the  *Symbols* service.
- Right mouse-click on *Receive Symbols* and select  *Add Symbol*.
- Rename the *Receive Symbols* to **receive0** and **receive1**.
- Edit the CAN IDs to **100h** and **110h**.
- Right mouse-click on the *Transmit Symbols* symbol and select  *Add Symbol*.
- Rename the transmit symbol to **transmit0**.
- Edit the CAN ID to **500h** and the *Send Period* to **100 ms**.
- Perform a right mouse-click on the *transmit0* symbol and select  *Add Variable*.

The *Signals* dialog box opens.

- Select the *Signal-out* signal and confirm with *OK*.
- Add *Signal-in0* to *receive0* and *Signal-in1* to *receive1*.
- Click on the *Signal-in0* variable and edit the *Length* to **16 bits**
- Repeat the previous step with *Signal-in1* and *Signal-out*.




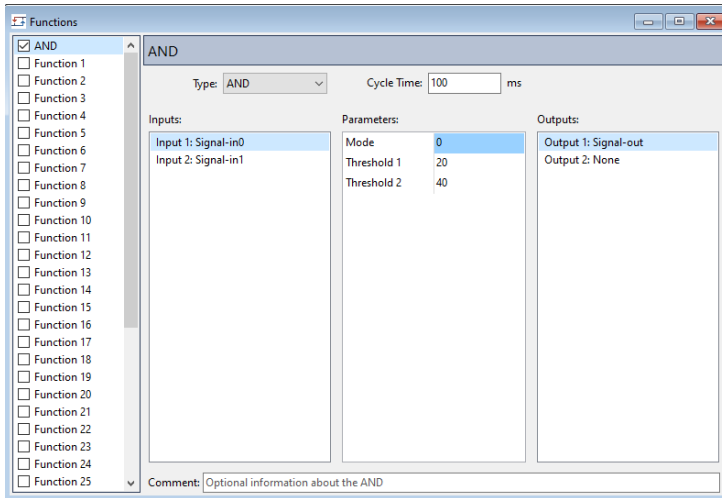
- Click on the  *Connect* toolbar item and select your available PCAN hardware (e.g PCAN-USB FD).
Consider the settings in step 3.


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

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

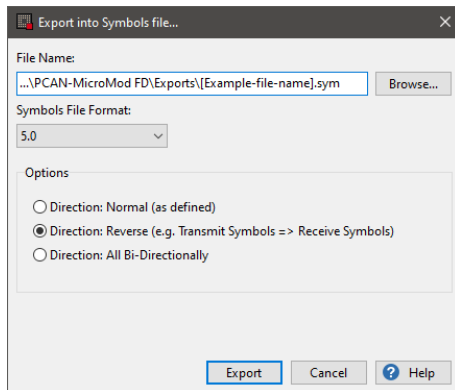
2.5.2 Example 8: Function (AND)

1. Proceed the steps in chapter *First Steps for Examples 8 to 10*
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.



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

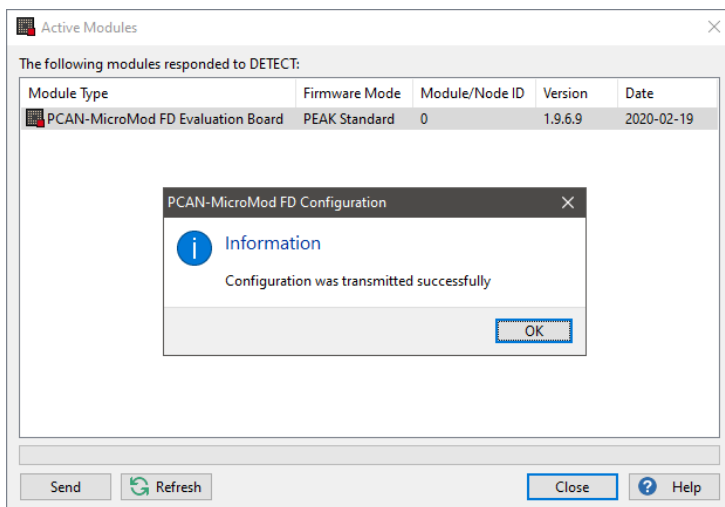
13. Select the *Direction Reverse* option.



14. Confirm with *Export* to create the Symbols file.

15. Click on ► *Send Configuration*.


16. Select the module and click *Send*.

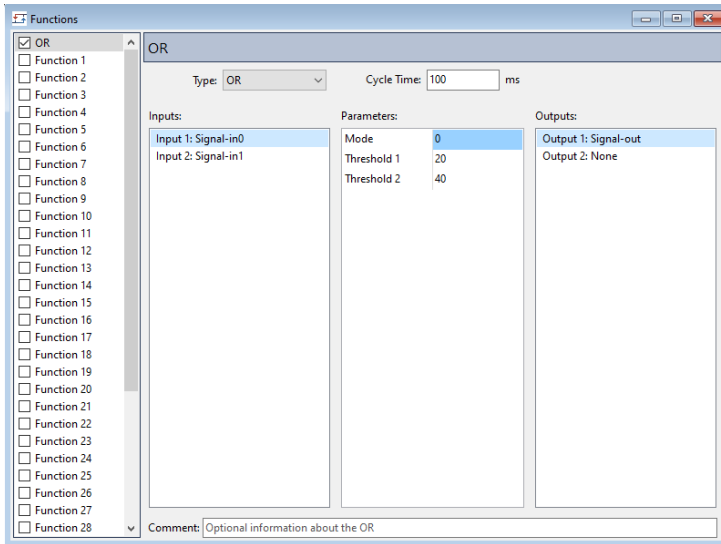



Evaluation with the PCAN-Explorer 6:

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 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)* and the CAN message 101h is greater than *Threshold 2 (40)*.
Otherwise, *Signal-out* value in the *Data* column is set to 0.

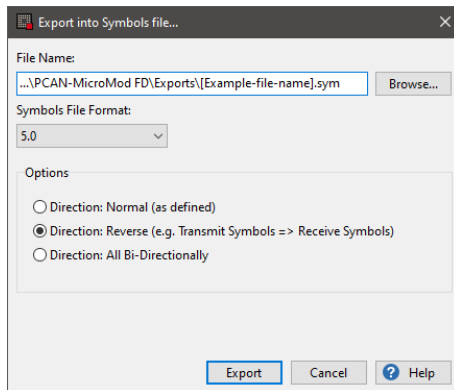
2.5.3 Example 9: Function (OR)

1. Proceed the steps in chapter *First Steps for Examples 8 to 10*
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 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.



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

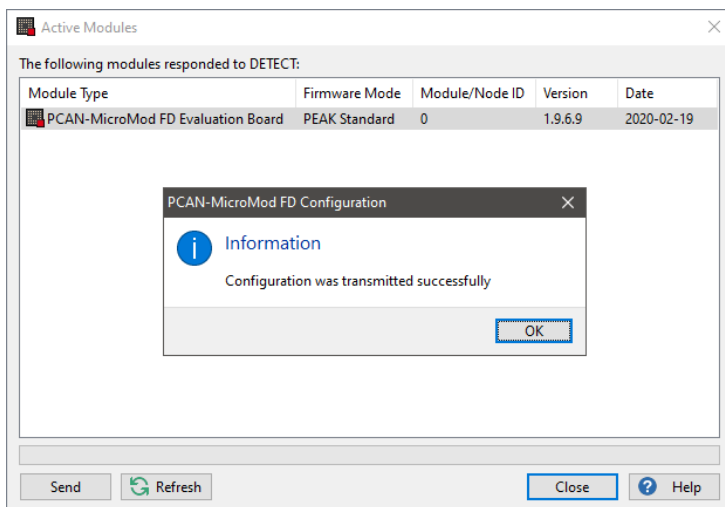
13. Select the *Direction Reverse* option.



14. Confirm with *Export* to create the Symbols file.

15. Click on ► *Send Configuration*.


16. Select the module and click *Send*.

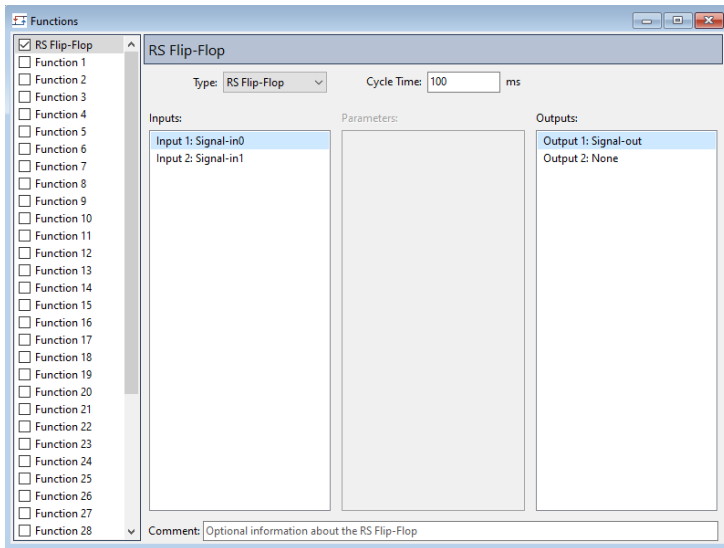



Evaluation with the PCAN-Explorer 6:

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 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 *Data* of *Signal-out* should be 1 when the value of the CAN message 100h is greater than *Threshold 1 (20)* or the CAN message 101h is greater than *Threshold 2 (40)*.
Otherwise, *Signal-out* value in the *Data* column is set to 0.

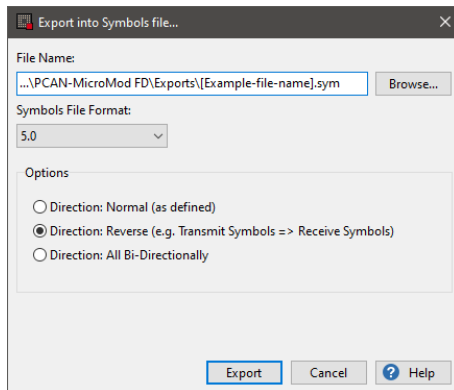
2.5.4 Example 10: Function (RS Flip-Flop)

1. Proceed the steps in chapter *First Steps for Examples 8 to 10*
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 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.



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

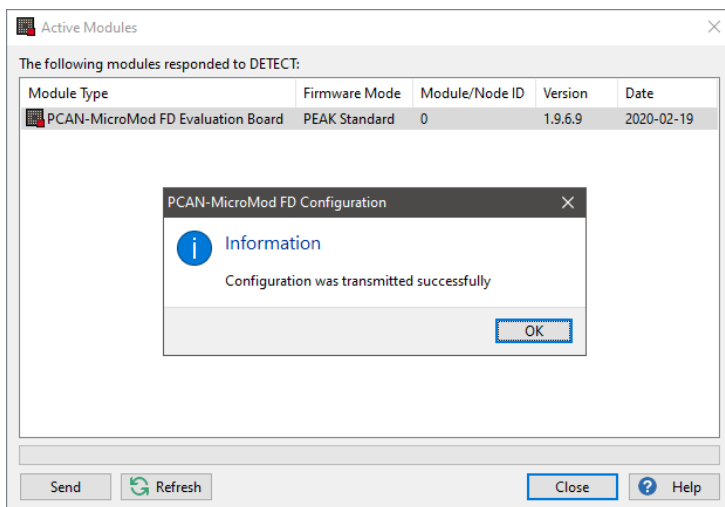
12. Select the *Direction Reverse* option.



13. Confirm with *Export* to create the Symbols file.

14. Click on ► *Send Configuration*.


15. Select the module and click *Send*.

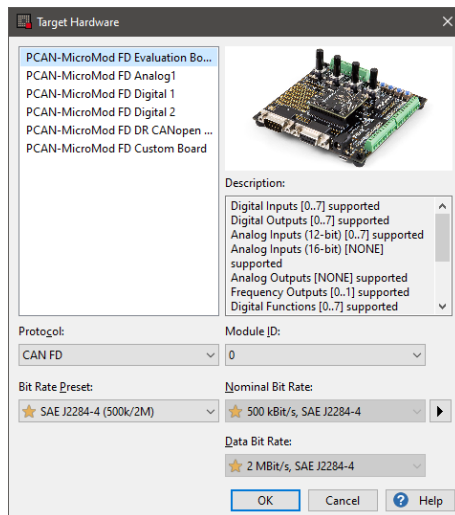




Evaluation with the PCAN-Explorer 6:

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 500h*.
5. In the *Receive / Transmit* window, define CAN messages 100h and 101h. For example:
 - 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.

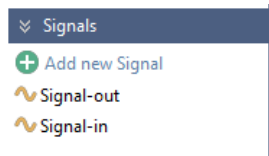
2.5.5 First Steps for Examples 11 to 13

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.




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 **Signalout**.




9. Open 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 the *Transmit Symbols* symbol 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*.

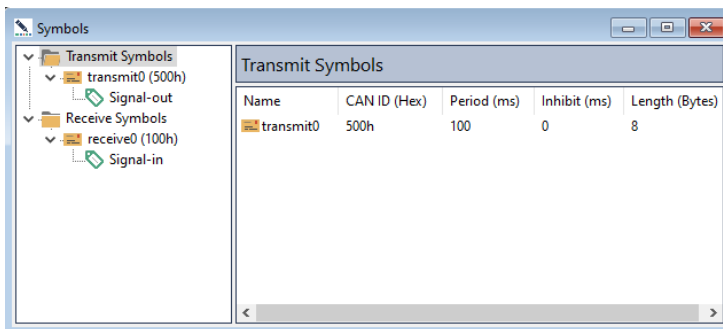
The *Signals* dialog box opens.

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*.

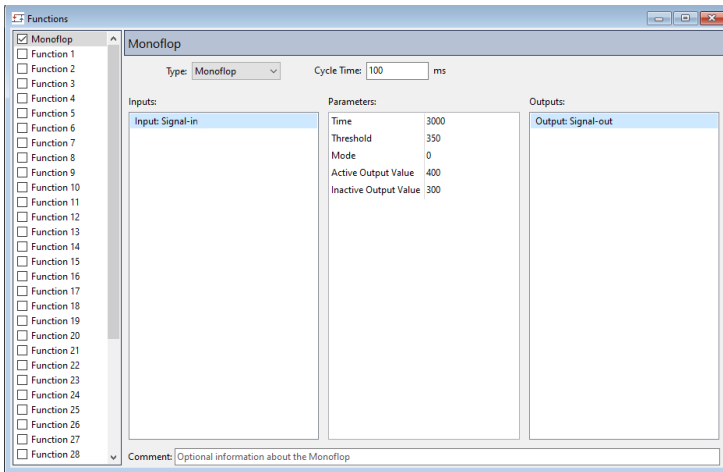



Now continue with the corresponding examples (11 to 13):

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

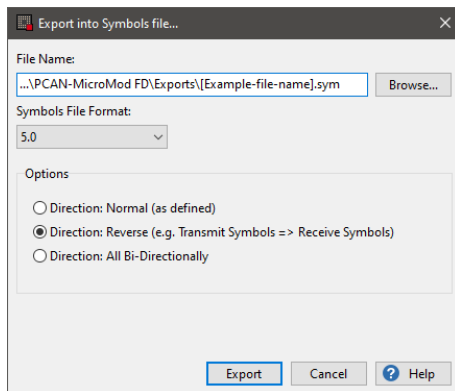
2.5.6 Example 11: Function (Monoflop)

1. Proceed the steps in chapter *First Steps for Examples 11 to 13*
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.



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

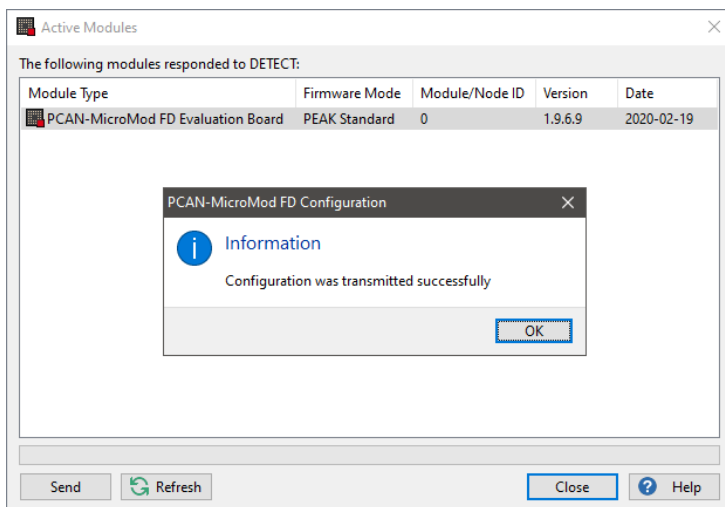
12. Select the *Direction Reverse* option.



13. Confirm with *Export* to create the Symbols file.

14. Click on ► *Send Configuration*.


15. Select the module and click *Send*.

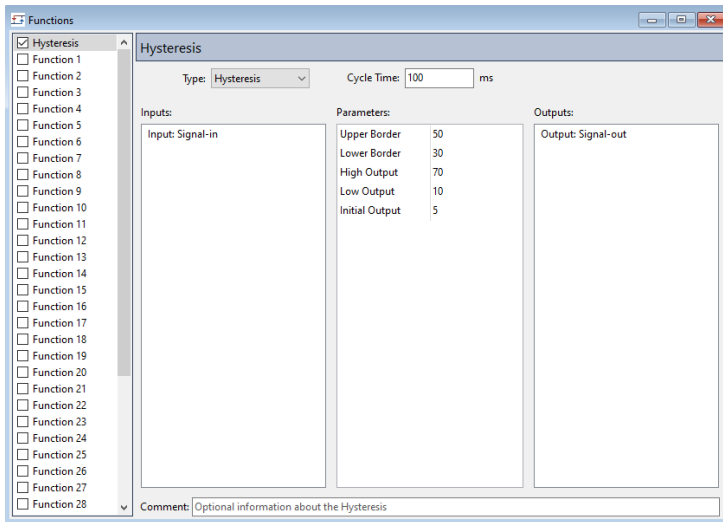



Evaluation with the PCAN-Explorer 6:

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. 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).

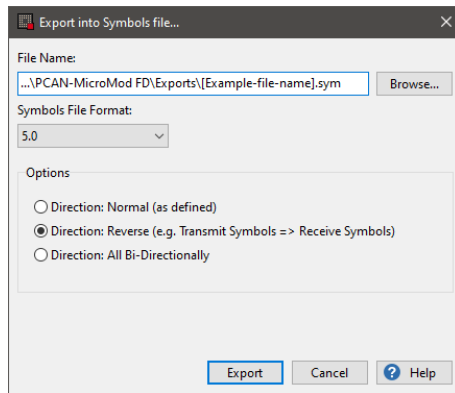
2.5.7 Example 12: Function (Hysteresis)

1. Proceed the steps in chapter *First Steps for Examples 11 to 13*
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: 50
9. Right mouse click on *Output* to open the context menu.
10. Select the *Signal-out* signal.

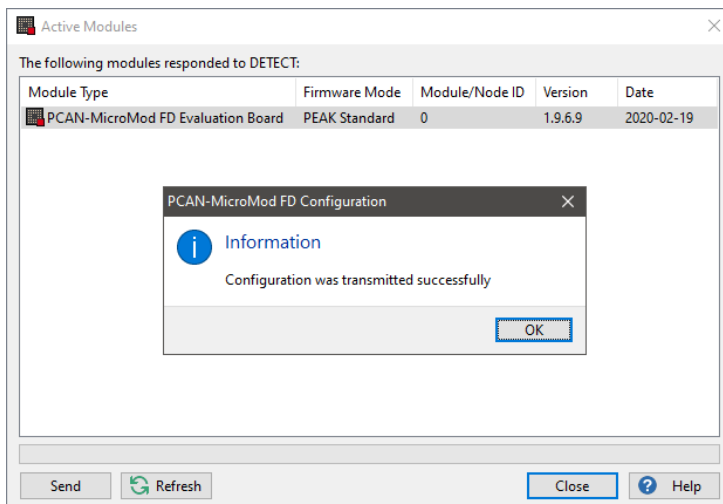


11. Click on  *Export and Into Symbols File....*

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





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

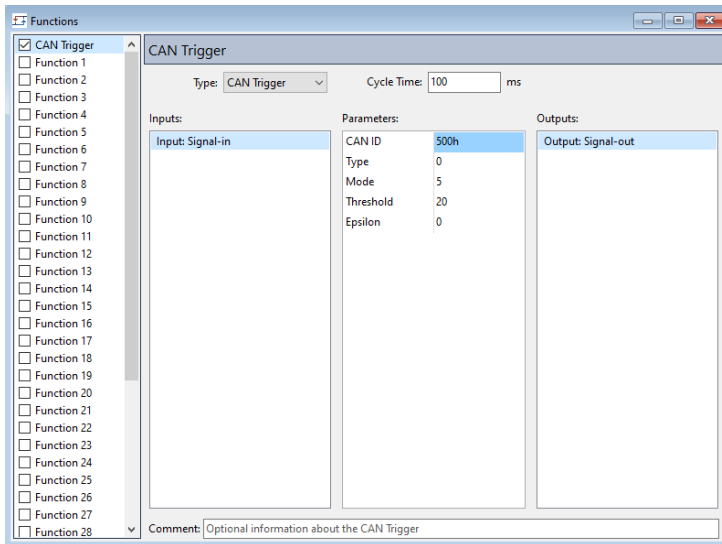



Evaluation with the PCAN-Explorer 6:

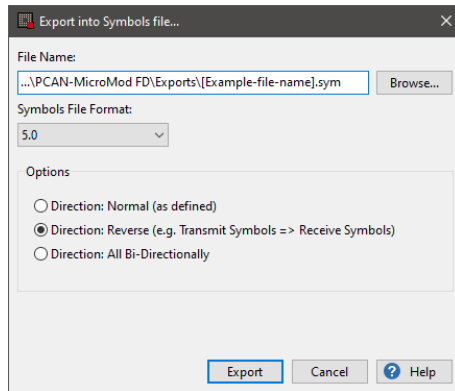
1. Open the PCAN-Explorer 6 software.
2. Create an empty project and establish a connection to our CAN bus.
3. In the *Project Manager*, click on *Add* and select the Symbols file you created a few moments ago.
4. Right mouse-click on that Symbols file and select *Apply*.
You should receive the CAN message with the CAN ID 500h.
5. In the *Receive / Transmit* window, 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)

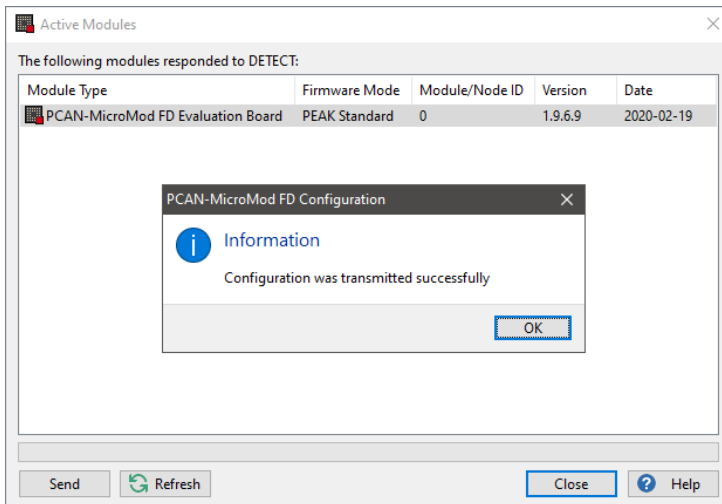
1. Proceed the steps in chapter *First Steps for Examples 11 to 13*
2. Open the  *Symbols* service.
3. Select the transmit symbol 500h and edit the *Send Period* to **1000 ms**.
4. Open the  *Functions* service.
5. Select *Function 0* in the left column.
6. Select *CAN Trigger* in the *Type* drop-down 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.



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



- Confirm with *Export* to create the Symbols file.
- Click on  *Send Configuration*.
- Select the module and click *Send*.



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*.
The CAN message 500h should be received each 1000 ms.
5. In the *Receive / Transmit* window, 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 $\text{Input} > \text{Threshold}$.