BOSCH

PowerBox PBX 190

Manual

Version 2.1 18/02/2020

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1 About PowerBox PBX 190

The Bosch PowerBox PBX 190 takes the whole Power Control Module concept much further than existing modules. It provides an effective and inspired alternative to conventional relays, circuit breakers, fuses and wires that can so often be a tangle of complexity and untidiness around a typical racing car's power junction box.

Bosch PowerBox PBX 190 is a compact and light weight module, measuring 245 x 183 x 37 mm (including connectors).

Bosch PowerBox PBX 190 has 52 outputs. All outputs are protected against reversed battery polarity. Current draw can be measured on all outputs from 0 mA.

Any of these channels can be controlled by various types and combinations of inputs. You'll find more information at Technical Specifications [▷ 39].

Instead of using a conventional control program, Bosch PowerBox PBX 190 benefits from a 667 MHz dual Core Processor and a multitasking operating system, allowing simultaneous executions of operations.

Please note that the maximum recommended current draw per channel is limited by the connector contacts (wiring loom side) - not by Bosch PowerBox PBX 190s driver stages. We have rated the individual channel's current draw in relation to the connector manufacturer's specifications.

Bosch PowerBox PBX 190 is programmed to shut overloaded channels down if the current draw or internal junction temperatures exceed pre-set levels.

A smart algorithm allows automatically turning-on of loads with a high inrush current.

The current draws and channel status can be logged internally and exported via one of the three available CAN bus.

⚠ WARNING

Please note that the PowerBox PBX 190 is not intended to be used to control safety-critical systems on a vehicle, such as ABS braking, power steering, etc..

Bosch Motorsport shall not be responsible for any incidental or consequential damages or injuries that may occur if the unit is used to control these, or similar, safety-critical systems.

2 Hardware

The Bosch PowerBox PBX 190 enclosure is CNC machined to the highest standards. The two parts of the casing are sealed by an O-ring, located in a recess in the main half. A lip in the lid presses on the O-ring and assures a water tight sealing (IP67). The connectors are individually sealed.

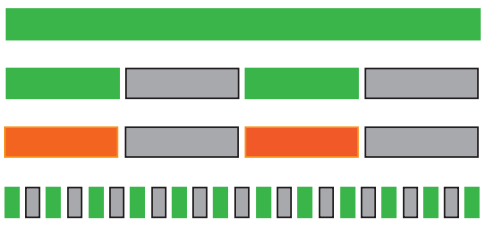
2.1 Ventilation

To reach specified current values an airflow of 2 m/s over the PBX 190 housing is recommended.

2.2 Status LEDs

Each LED on the PBX 190 has its own color code with different meanings.

The following table explains the different meanings:

Fail		**Off** No error **Red solid** At least one entry in the error log **Red blinking** (2 Hz) At least one active error present
User		**Off/Blue** Controlled by functionblock „User_LED“
Pow		**Off** Power supply missing **Green solid** Power supply valid
Run		**Green solid** No configuration active **Green blinking** (2 Hz) Configuration active **Orange blinking** (2 Hz) Configuration error **Green flickering** (10 Hz) Emergency state

2.3 Pin Configuration

Connector X1: 37 Pins / 8STA62437SA			
Pin	**Signal**	**Cont. [A]**	**Peak [A]**
A	HS_15A X1_A	15	100
B	HS_15A X1_B	15	100
C	HS_15A X1_C	15	100
D	HS_15A X1_D	15	100
E	HS_15A X1_E	15	100
F	HS_15A X1_F	15	100
G	HS_15A X1_G	15	100
H	HS_15A X1_H	15	100
J	HS_15A X1_J	15	100
K	HS_15A X1_K	15	100
L	HS_15A X1_L	15	100
M	HS_15A X1_M	15	100
N	HS_15A X1_N	15	100
P	PWM_15A X1_P	15	60
R	PWM_15A X1_R	15	60
S	PWM_15A X1_S	15	60
T	PWM_15A X1_T	15	60
U	HS_15A X1_U	15	100
V	HS_15A X1_V	15	100
W	HS_15A X1_W	15	100
X	HS_15A X1_X	15	100
Y	HS_15A X1_Y	15	100
Z	HS_15A X1_Z	15	100
a	HS_15A X1_a	15	100
b	HS_15A X1_b	15	100
c	PWM_15A X1_c	15	60
d	PWM_15A X1_d	15	60
e	PWM_15A X1_e	15	60
f	PWM_15A X1_f	15	60
g	HS_15A X1_g	15	100
h	HS_15A X1_h	15	100
k	HS_15A X1_k	15	100
m	HS_15A X1_m	15	100
n	HS_15A X1_n	15	100
p	Power KL31	15	-
q	Power KL31	15	-
r	Power KL31	15	-

Connector X2: 1 Pin / 8STA61201BN261			
Pin	**Signal**	**Cont. [A]**	**Peak [A]**
1	Power Supply 12 V	200	240

Connector X3: 19 Pins / 8STA62419SN			
Pin	**Signal**	**Cont. [A]**	**Peak [A]**
A	HS_25A X3_A	25	150
B	HS_25A X3_B	25	150
C	HS_25A X3_C	25	150
D	HS_25A X3_D	25	150
E	HS_25A X3_E	25	150
F	HS_25A X3_F	25	150
G + H	HS_40A X3_G_H	40	150
J + T	HS_40A X3_J_T	40	150
K + U	HS_40A X3_K_U	40	150
L + N	HS_40A X3_L_N	40	150
M	HS_25A X3_M	25	150
P	HS_25A X3_P	25	150
R	HS_25A X3_R	25	150
S	HS_25A X3_S	25	150
V	Power KL31	25	-

Connector X4: 6 Pins / 8STA61606SA			
Pin	**Signal**	**Cont. [A]**	**Peak [A]**
A	HS48V_25A X4_A	25	100
B	HS48V_25A X4_B	25	100
C	HS48V_25A X4_C	25	100
D	HS48V_25A X4_D	25	100
E	Supply up to 48 V for X4	25	35
F	Supply up to 48 V for X4	25	35

Connector X5: 66 Pins / 8STA6-18-35SN		
Pin	**Signal**	
1	Analog Input X5_01	0 to 5 V, Pull-up
2	Analog Input X5_02	0 to 5 V, Pull-up
3	Analog Input X5_03	0 to 5 V, Pull-up
4	Analog Input X5_04	0 to 5 V, Pull-up
5	Analog Input X5_05	0 to 5 V, Pull-up
6	Analog Input X5_06	0 to 5 V, Pull-up
7	Analog Input X5_07	0 to 5 V, Pull-up
8	Analog Input X5_08	0 to 5 V, Pull-up
9	CAN 3 Interface Low-Level	Max. 1 Mbaud
10	Analog Input X5_10	0 to 5 V, Pull-up
11	Analog Input X5_11	0 to 5 V, Pull-up

Connector X5: 66 Pins / 8STA6-18-35SN		
12	Analog Input X5_12	0 to 5 V, Pull-up
13	Digital Input X5_13	0 to 12 V, Pull-up, Pull-down
14	Digital Input X5_14	0 to 12 V, Pull-up, Pull-down
15	CAN 3 Interface High-Level	Max. 1 Mbaud
16	LIN	Control of Bosch Motorsport LIN devices included. Support of other devices on request.
17	Analog Input X5_17	0 to 5 V, Pull-up
18	Analog Input X5_18	0 to 5 V, Pull-up
19	DGND-fused	5 A
20	DGND-fused	5 A
21	Digital Input X5_21	0 to 12 V, Pull-up, Pull-down
22	Digital Input X5_22	0 to 12 V, Pull-up, Pull-down
23	SERCOS1 TXP	
24	SERCOS1 TXN	
25	do not connect (use for internal debugging)	
26	do not connect (use for internal debugging)	
27	Analog Input X5_27	0 to 5 V, Pull-up
28	Digital Input X5_28	0 to 12 V, Pull-up, Pull-down
29	Digital Input X5_29	0 to 12 V, Pull-up, Pull-down
30	Analog Input X5_30	0 to 5 V, Pull-up
31	KL31-fused	
32	SERCOS1 RXP	
33	SERCOS1 RXN	
34	do not connect (use for internal debugging)	
35	do not connect (use for internal debugging)	
36	Digital Input X5_36	0 to 12 V, Pull-up, Pull-down
37	Digital Input X5_37	0 to 12 V, Pull-up, Pull-down
38	Analog_Screen	
39	Analog Input X5_39	0 to 5 V, Pull-up
40	KL31-fused	
41	SERCOS2 RXP	
42	SERCOS2 RXN	
43	Digital Input X5_43	0 to 12 V, Pull-up, Pull-down
44	Digital Input X5_44	0 to 12 V, Pull-up, Pull-down
45	Sensor GND for X5_51	5 A
46	Timesync	
47	COM_Screen	
48	CAN 1 Interface High-Level	Max. 1 Mbaud
49	SERCOS2 TXP	
50	SERCOS2_TXN	
51	Powersupply_5V X5_51	400 mA

Connector X5: 66 Pins / 8STA6-18-35SN		
52	Sensor GND for X5_58	5 A
53	ETHERNET1 RXN	10/100 Mbps
54	ETHERNET0 RXN	10/100 Mbps
55	CAN 2 Interface Low-Level	Max. 1 Mbaud
56	CAN 1 Interface Low-Level	Max. 1 Mbaud
57	Analog Input X5_57	0 to 5 V, Pull-up
58	Powersupply_5V X5_58	400 mA
59	ETHERNET1 RXP	10/100 Mbps
60	ETHERNET1 TXN	10/100 Mbps
61	ETHERNET0 TXN	10/100 Mbps
62	CAN 2 Interface High-Level	Max. 1 Mbaud
63	Analog Input X5_63	0 to 5 V, Pull-up
64	ETHERNET1 TXP	10/100 Mbps
65	ETHERNET0 RXP	10/100 Mbps
66	ETHERNET0 TXP	10/100 Mbps

2.4 Supply Concept

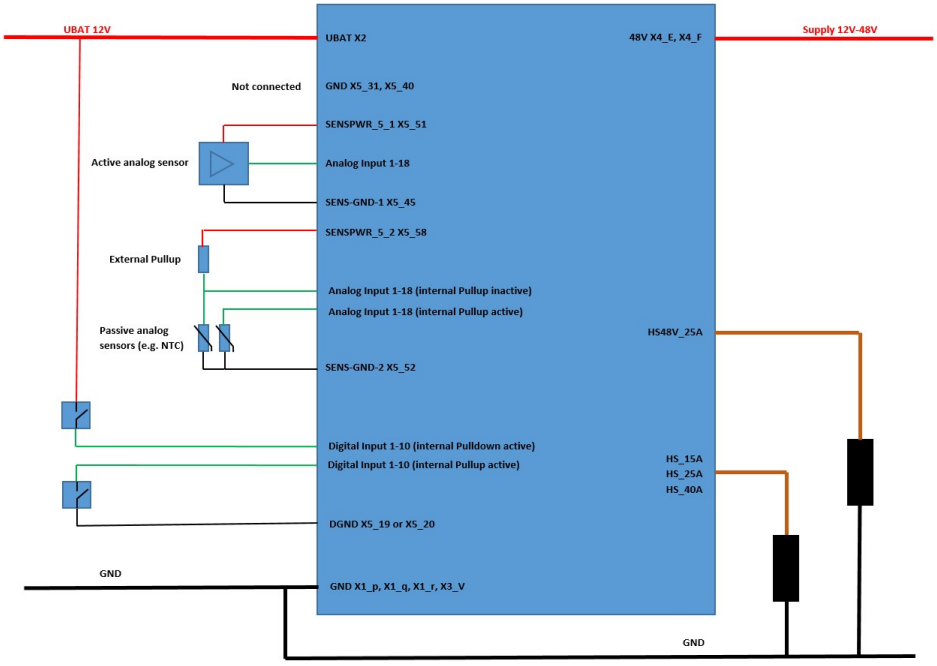
The battery supply of the device and the supply of all switches is done via X2. The best way to connect the PowerBox to GND is only using X1_p, X1_q, X1_r and X3_V. GND current is limited to 75 A.

KL31-fused pins (X5_31 and X5_40) can also be used to connect the supply to the PowerBox with GND. This is only recommended when only highside switches and no internal freewheeling diodes are used.

To supply active sensors with 5 V use SENSPWR_5_1 (X5_51) and SENSPWR_5_2 (X5_58). SENS-GND-1 (X5_45) and SENS-GND-2 (X5_52) are the reference ground of these sensor supply voltages. Use these two ground pins preferred for analog sensor reference.

For digital inputs ground reference pins X5_19 and X5_20 can be used.

Recommended wiring



2.5 48 V Stages

GND of 48 V and GND of 12 V battery must be shorted. A galvanic isolation of supplies is not supported. An external capacitor is recommended to limit voltages spikes on the supply line at load drop.

It is recommended to use an external fuse when using 48 V to be safe in case of a shortcut to GND. For details using 48 V in PBX 190 please contact Bosch Motorsport.

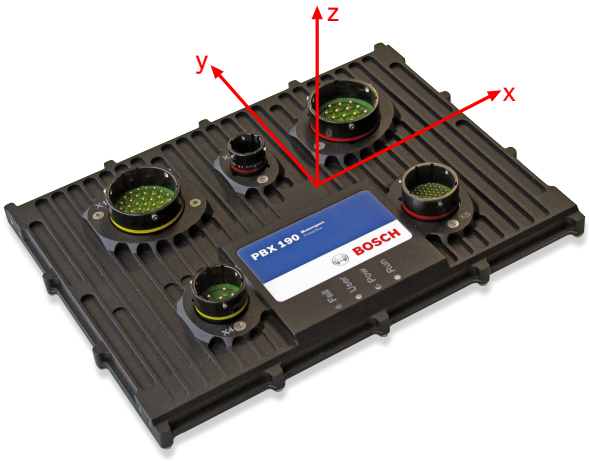
2.6 Current measurement

Each Output stage has its own shunt resistor to measure the output current. Here you can find an overview of the current measurement accuracy.

	Measurement range	Accuracy
HS_15A	0 to 95 A	1 % ±50 mA
HS_25A, HS_40A	0 to 190 A	1 % ±100 mA
PWM_15A	-40 to 40 A	1 % ±50 mA (depends on PWM frequency and duty cycle)
HS48V_25A	0 to 80 A	1 % ±50 mA

2.7 Inertial Sensors

PBX 190 has implemented a low and a high G-Sensor as well as a gyroscope sensor. The measured acceleration of the internal sensors reflects the acceleration of the device at its mounting position. Below you can see the orientation of the measurement axis and the accuracy of the sensors.



	Measurement range	Accuracy
Low G-Sensor	±20 g in each direction	3 % ±0.2 g
High G-Sensor	±200 g in each direction	1 % ±3 g
Gyroscope Sensor	±2000 °/s in each direction	3 % ± 3 °/s

⚠ CAUTION

The sensors functionality is only guaranteed when device temperature is max. 85°C.

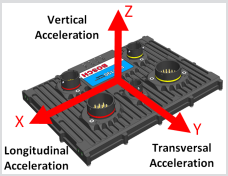
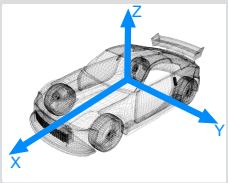
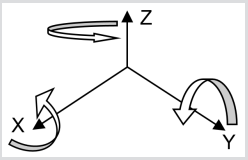
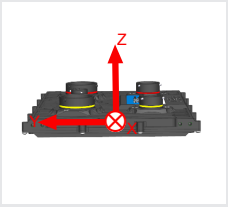
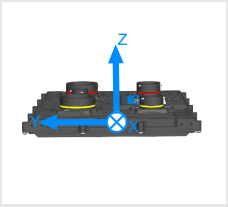
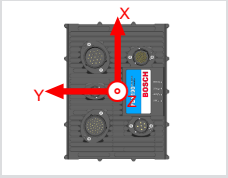
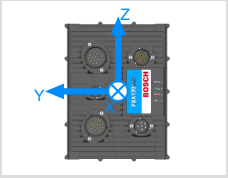
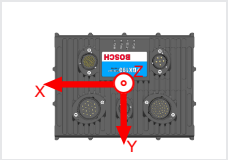
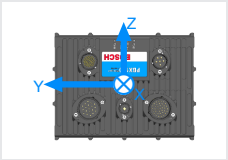
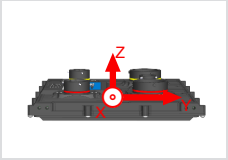
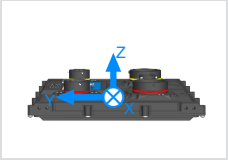
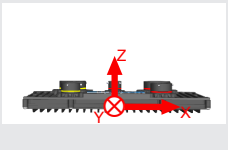
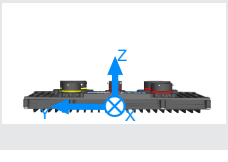
⚠ CAUTION

ECU internal sensor values must not be used for safety related functionality, e.g. ABS

The sensor values are provided by the function block "*Acceleration*"

An angular correction from the device to the vehicle coordinate system can be performed by setting the function block parameters "*AnglePos_ECU_X/_Y/_Z*" according to the z, y', x''-convention generally used in the vehicle technics.

The following table gives some examples for the angular correction values for different mounting positions:

Unit Direction	Vehicle Direction	Acceleration raw Value [g]	Acceleration after CT* calculation [g]
			Right-Hand-System rotation in positive angles against clockwise direction
		AnglePosEcu_X = 0 AnglePosEcu _Y = 0 AnglePosEcu _Z = 0	Accx = 0 Accy = 0 Accz = 1
		AnglePosEcu _X = 0 AnglePosEcu _Y = -90 AnglePosEcu _Z = 0	Accx = 0 Accy = 0 Accz = 1
		AnglePosEcu _X = -90 AnglePosEcu _Y = 0 AnglePosEcu _Z = 90	Accx = 0 Accy = 0 Accz = 1
		AnglePosEcu _X = 0 AnglePosEcu _Y = 0 AnglePosEcu _Z = 180	Accx = 0 Accy = 0 Accz = 1
		AnglePosEcu _X = 0 AnglePosEcu _Y = 0 AnglePosEcu _Z = -90	Accx = 0 Accy = 0 Accz = 1

CT = coordinate transformation

⊗ vector pointing away from viewpoint

⊙ vector pointing towards viewpoint

2.8 Warnings and shutdown Thresholds

Due to thermal or pin current overload there are several warnings and shutdown thresholds. You can see an overview of these below.

Overcurrent	
Warning overcurrent X2	210 A for 0.2 s
Shutdown overcurrent X2	240 A for 2 s
Warning overcurrent X4_E and X4_F	55 A for 0.2 s
Shutdown overcurrent X4_E and X4_F	70 A for 2 s
Warning overcurrent over GND Pins on X1 and X3	75 A for 0.2 s

Overcurrent	
Shutdown overcurrent over GND Pins on X1 and X3	80 A for 2 s

Overtemperatur	
Warning overtemperature CPU	95°C for 2 s
Shutdown overtemperature CPU	100°C for 2 s
Warning overtemperature Device	95°C for 2 s
Shutdown overtemperature Device	115°C for 2 s

3 PBX Suite Installation

The setup file for the PBX Suite is provided at the Bosch Motorsport internet homepage at the product page of the PowerBox PBX 190.

For the PBX Suite a personal license key is required. This can be requested at order time of a PowerBox PBX 190 device or later by mail to LicenseMotorsport.BEG@de.bosch.com (For evaluation purpose a 30 days limited setup is also available without needing a license).

The installation requires administrator rights.

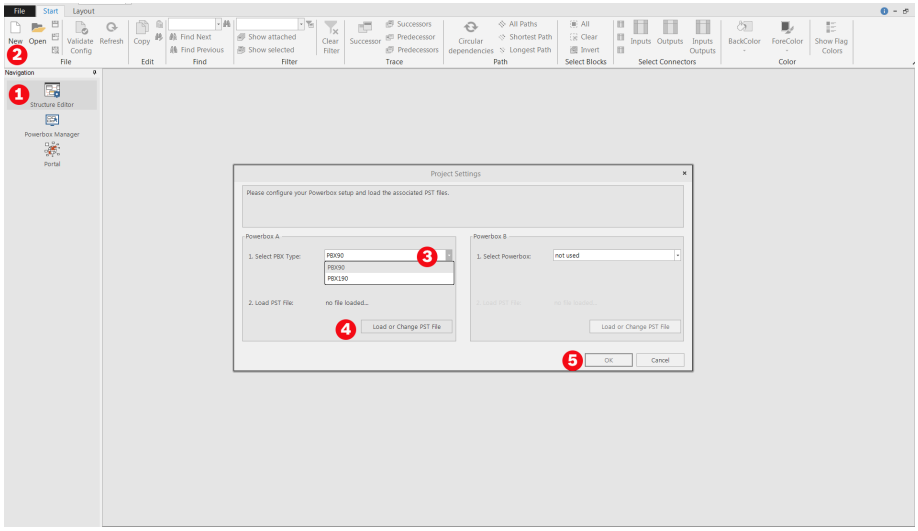
Start the installation by running **setup.exe** and follow the wizard steps.

4 The Structure Editor: Create a new configuration

A configuration is the unit you exchange between the programming tool PBX Suite and your PowerBox PBX 190 after all changes and modifications.

For creating a configuration we developed the PBX Suite. This software tool enables visual programming of the configuration of your PowerBox.

- Start the program **PBX Suite**.
- Click **Structure Editor** in the menu box on the left side (1).

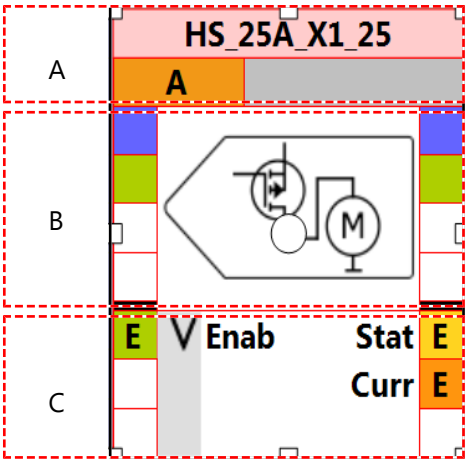


- Click **New** (2).
- Select your PBX type (3).
- Load the corresponding PST file (4).
- Confirm by clicking **OK** (5).

4.1 Function Blocks

The key technology of the PBX Suite is the function block. All functions of the PowerBox can be programmed and modified by using a string of function blocks.

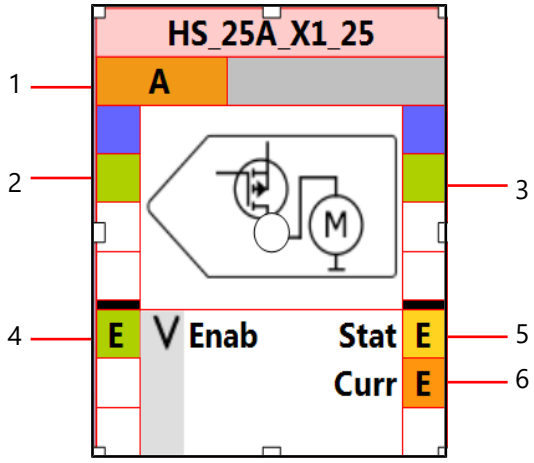
Every function block is divided into three parts:



- **A** is the top part that includes the unique name of the function block. It is user changeable.

- **B** is the middle part that shows static parameters of the function block.
- **C** is the bottom part that shows dynamic input and output signals of the function block.

In part B and part C the colored rectangles symbolize the signal connections: inputs on the left side and outputs on the right side.



1. Client assignment
2. Optional global block enable input.
3. Optional global block enable output, daisy-chained with input.
4. Signal input. Data type Boolean. Enabled for online view and export to RaceCon.
5. Signal output. Data type Integer. Enabled for online view and export to RaceCon.
6. Signal output. Data type Float. Enabled for online view and export to RaceCon.

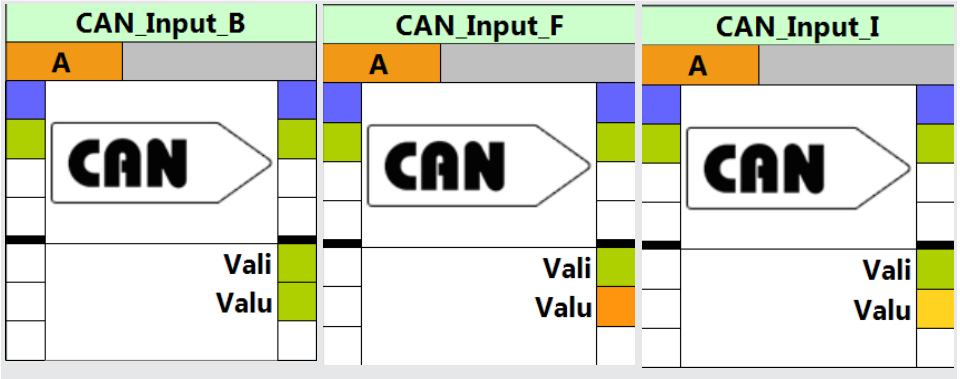
As you will have realized in the steps 4 to 6, the system offers signals of three different data types:

- **Boolean** (Background color always GREEN)
- **Integer** (Background color always YELLOW)
- **Float** (Background color always ORANGE)

If function blocks are available as different data type, you can identify the data type from the background color of the inputs and outputs and from the end of the function blocks name. The last letter will show the data type.

Example:

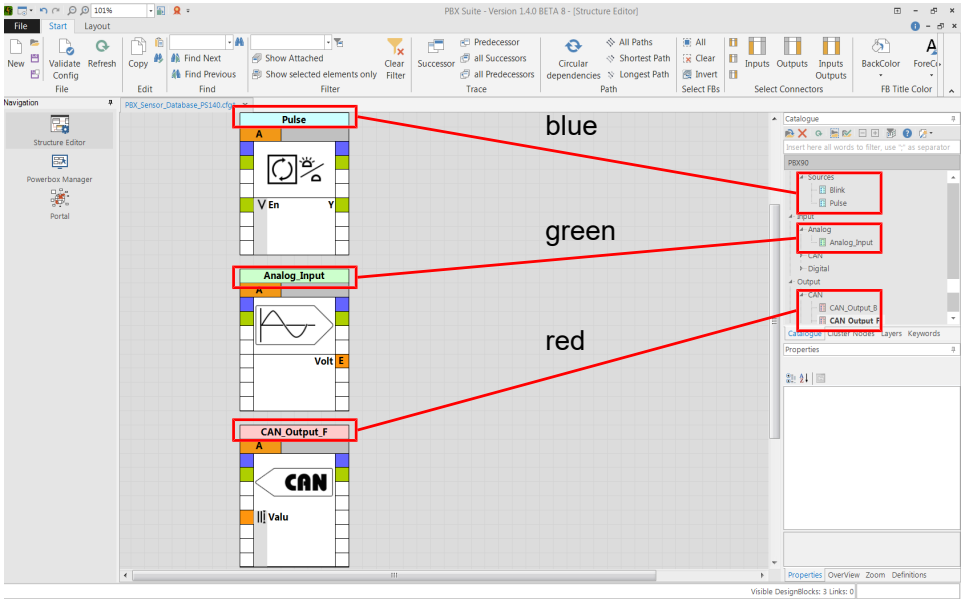
The function block CAN_Input is available as data type Boolean or data type Integer or data type Float. To separate one from the other we put a letter at the end of the function blocks name:



Color Scheme

The color of the function blockhead and the color of the symbol in the catalog both show the type of the function block:

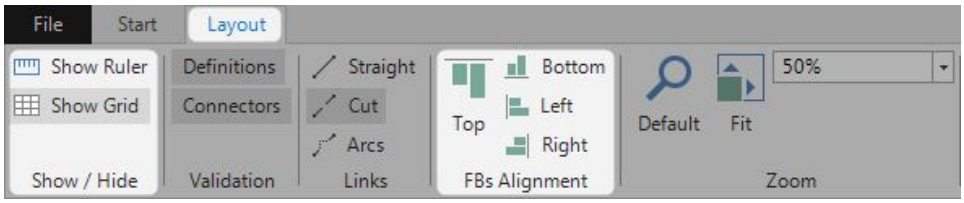
- **blue** for functions
- **green** for inputs
- **red** for outputs



4.2 Utilities for placing and arranging of Function Blocks

At the **Layout** tab

- Rulers and Grid can be enabled or disabled,
- several functions helping to align the Function Blocks are available.



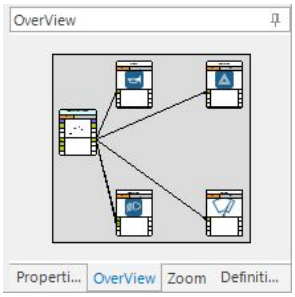
4.3 Navigating through the configuration

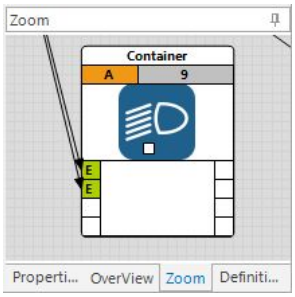
Use mouse wheel for zooming in or out.

Space bartoggles between current view and Zoom to Fit.

At the Quick Access Toolbarseveral zoom options are provided.

Use **OverView** or **Zoom** tab for a second farer or closer view.

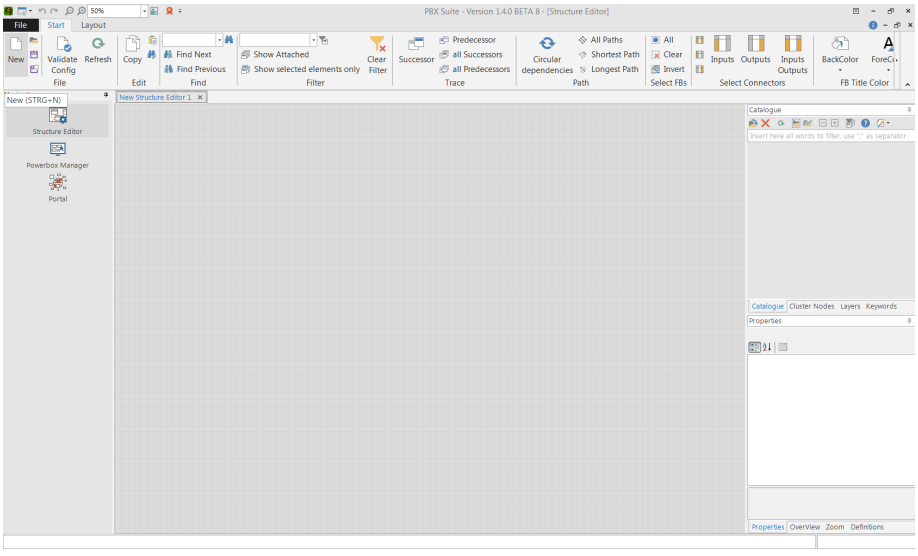




4.4 Example “Blower Control”

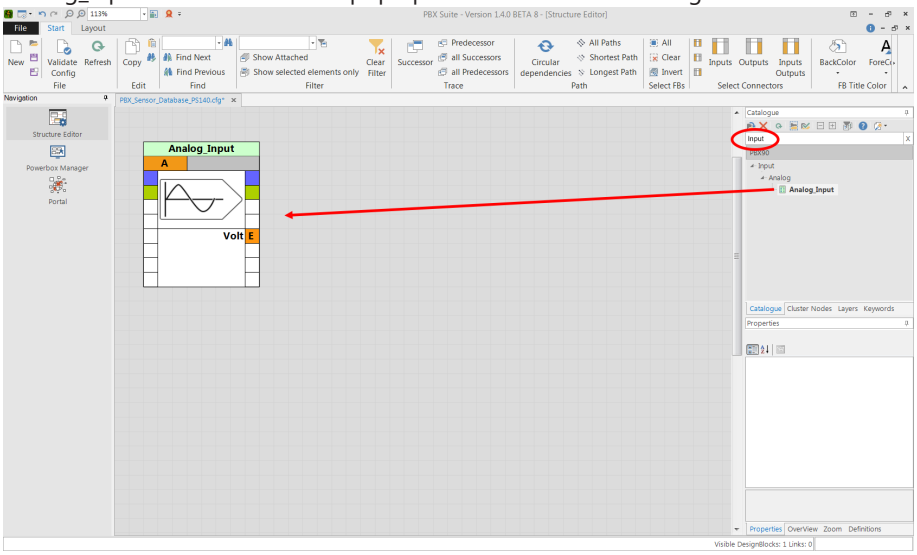
This chapter shows an example how to program the function **Blower Control** with the PBX Suite. The function shall start the cooling fan when the water temperature exceeds e.g. 90°C and stops it when the temperature falls below e.g. 80°C. You’ll reach it by setting Default to 90 and Hysteresis to 10 as shown in the following instructions.

1. Start the PBX Suite.
2. Click **Structure Editor** in the menu box on the left side.

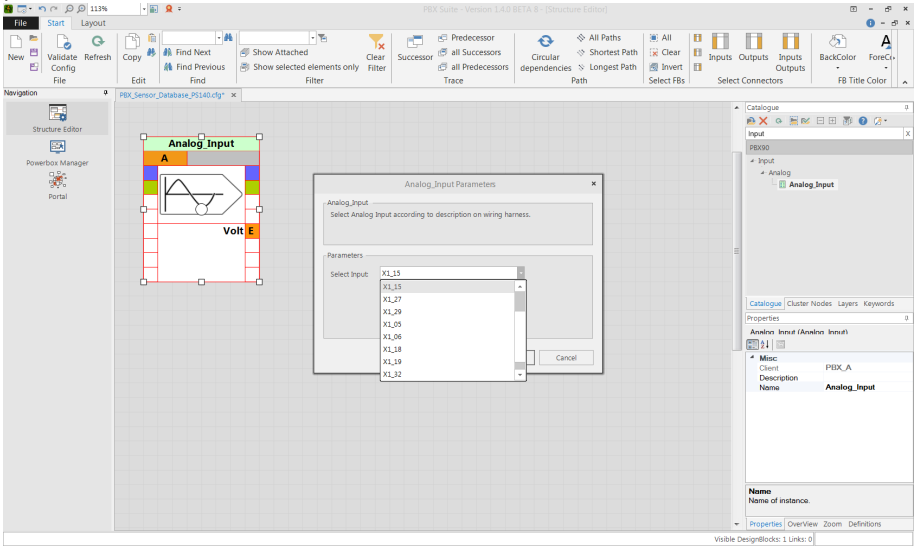


3. Click **New.**
4. Select your PBX Type.
5. Load the corresponding PST File.
6. Confirm by clicking **OK**.
7. Write **Input** in the text field of the Catalogue *[Insert here all words to filter, use “;” as separator]*.

8. Drag and Drop the function **Analog_Input** from the Catalogue onto the screen. The Analog_Input function block will pop up as shown in the following screenshot.

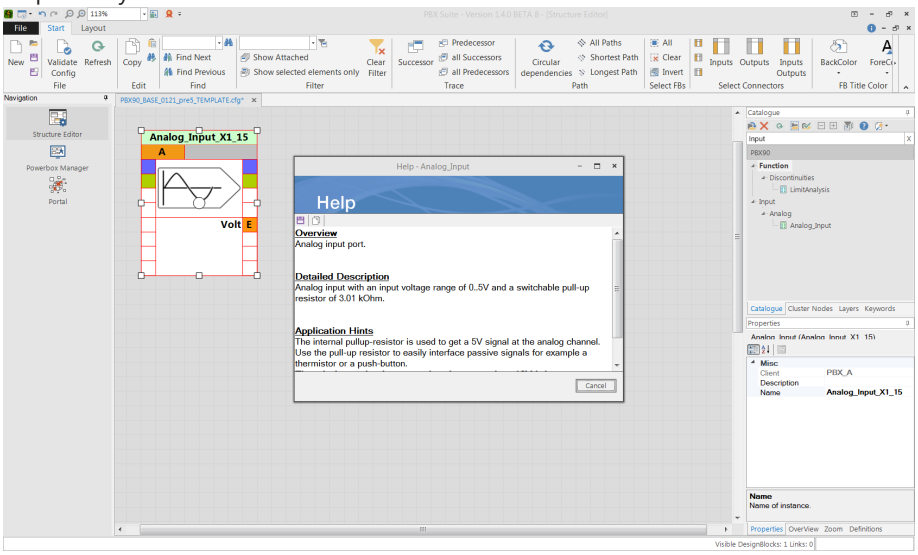


9. With double-click on the selected function block you open the pin assignment wizard. Select Input X5_10 from the pull down menu. X5 is the connectors name and 10 is the pins name.

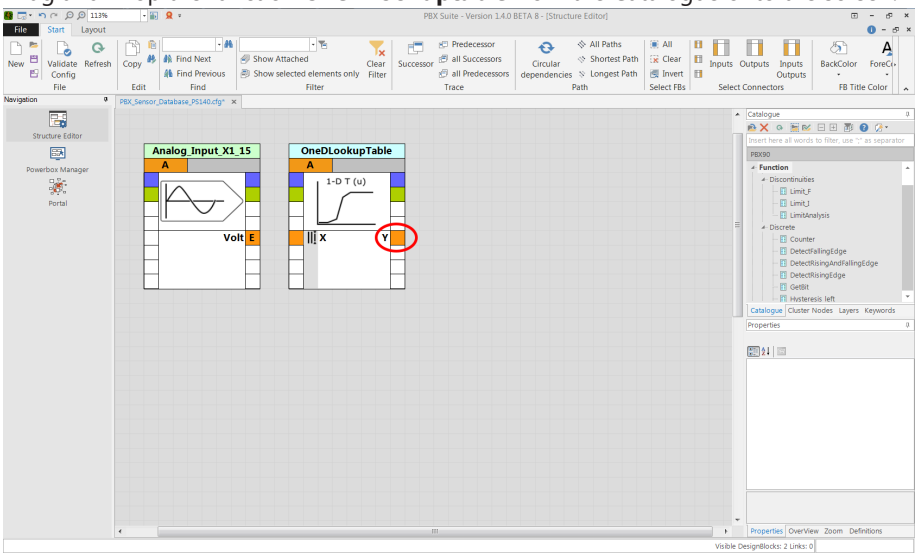


10. The assigned connector and pin are part of the function blocks name shown in the headline of the function block. Here it is X5_10, as you can see in the following screen shot.
    Notice: All function blocks can be renamed by changing the name in Properties / Name.

With click on F1 while function block selected, you open the context sensitive online help. Here you find further information.

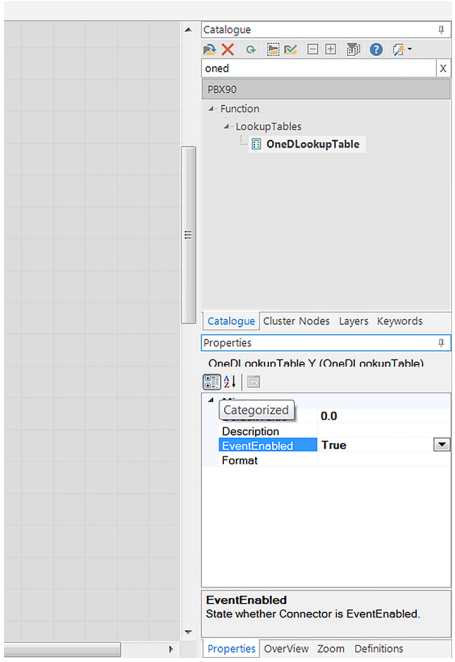


11. Write **Table** in the text field of the Catalogue.
12. Drag and Drop the function **OneDLookuptable** from the Catalogue onto the screen.

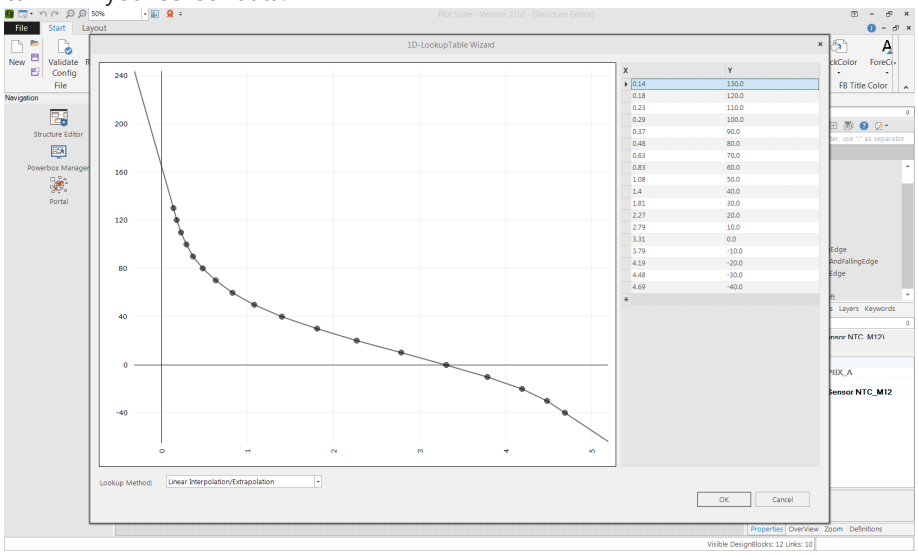


If you want to see the actual temperature in the Live Data later, please enable the OneDLookupTable by setting Y to enabled (red ring). Therefore you click on the or-

ange rectangle right of the Y. It gets red if activated. Choose Event Enabled -> True in the Properties block as shown in the following screenshot.

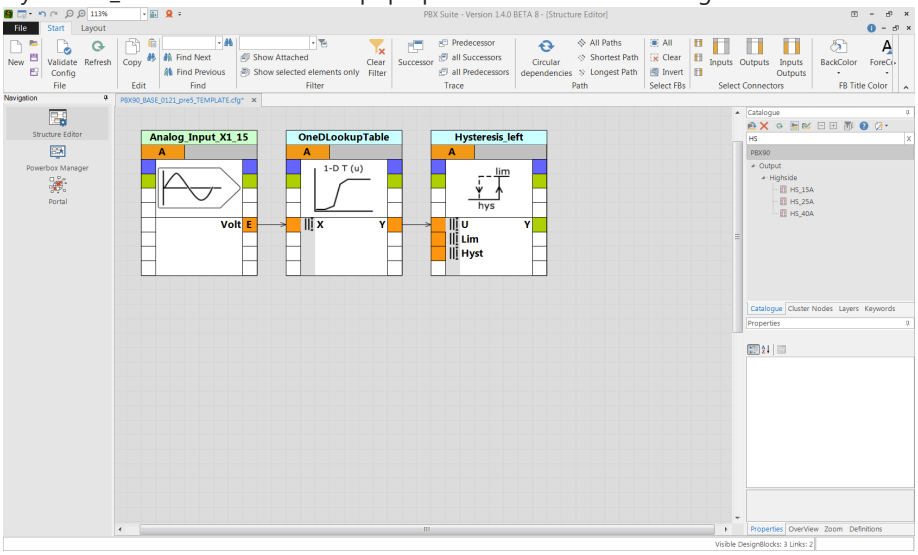


13. For more information about Live Data, please see View Live Data [▶ 32].
14. Double-click on the function OneDLookuptable opens a curve and a table where you can fill in your sensor data.

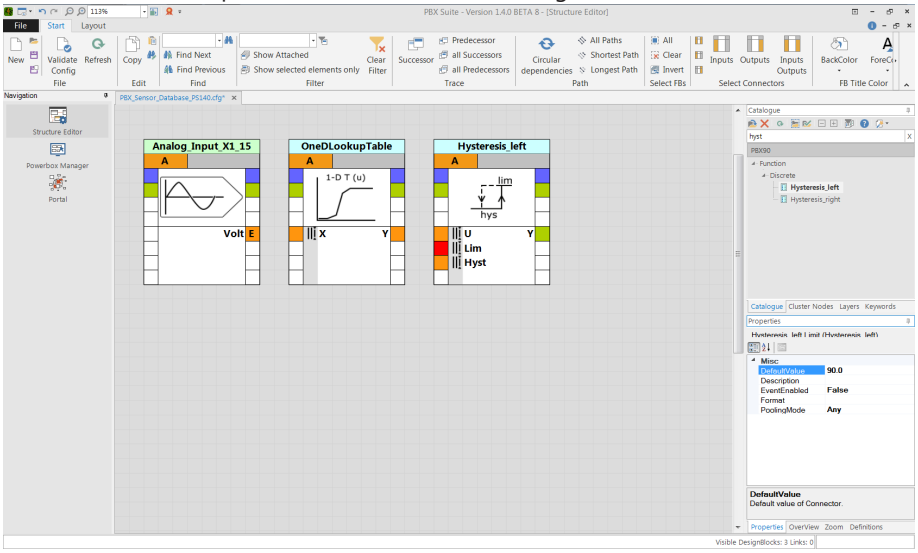


15. Write **hyst** in the text field of the Catalogue.

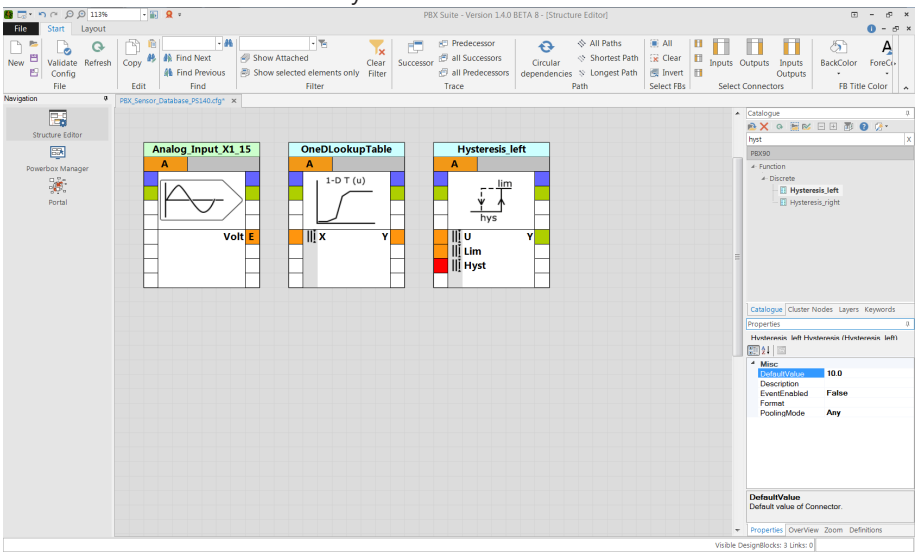
16. Drag and Drop the function **Hysteresis_left** from the Catalogue onto the screen. The Hysteresis_left function block will pop up as shown in the following screenshot.



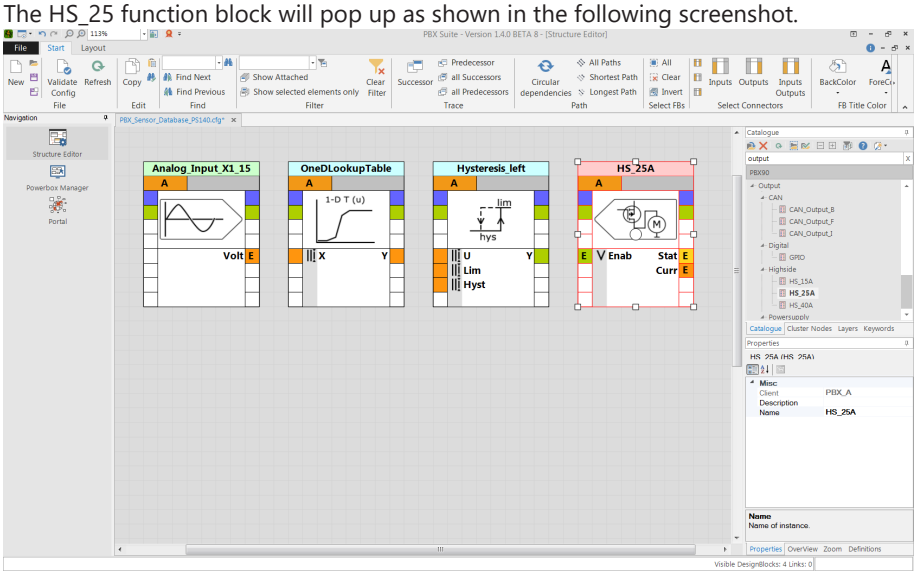
17. For setting the default values click the orange square left to Lim in the Hysteresis_left function block. It changes color to red when activated. Sign in the value 90.0 as DefaultValue under Properties as shown in the following screenshot.



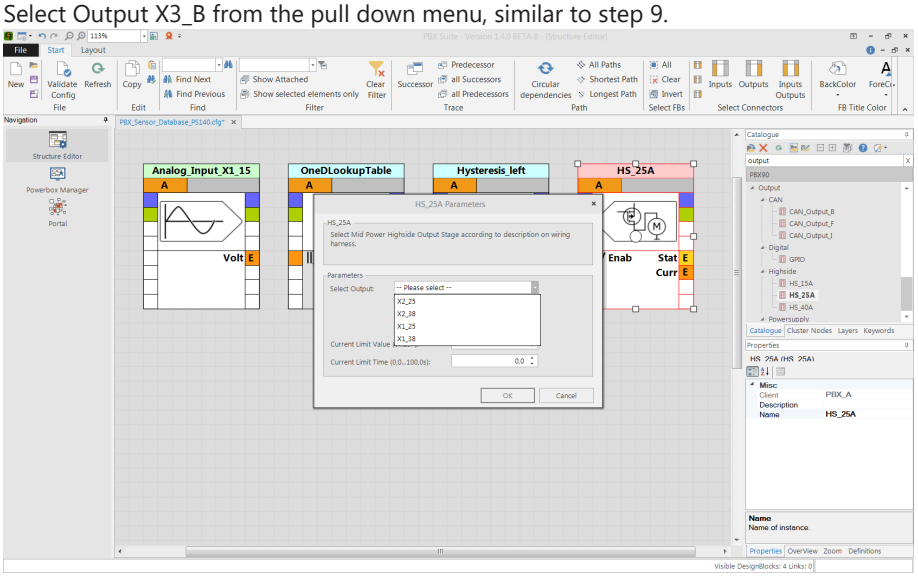
18. Set 10.0 as DefaultValue under Hyst in the same function block.



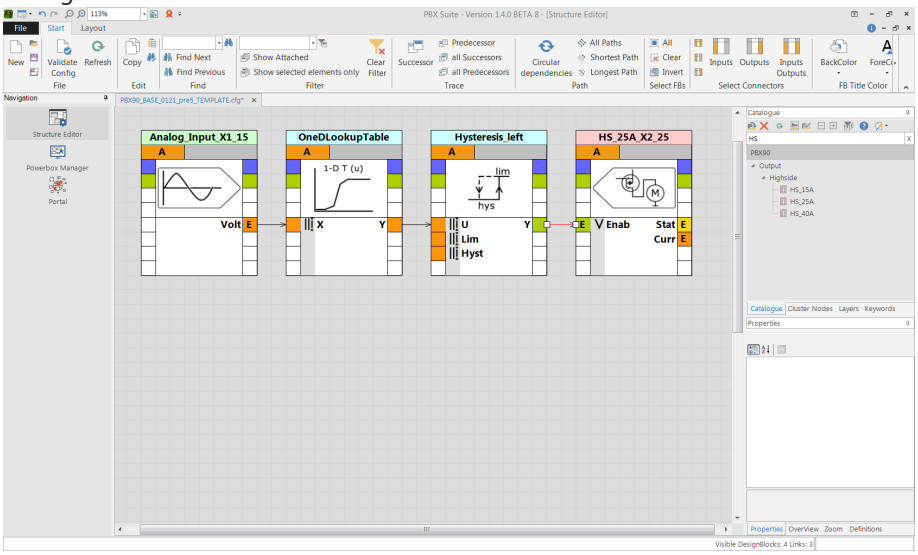
19. Write **output** in the text field of the Catalogue.
20. Drag and Drop the function **Highside HS_25A** from the Catalogue onto the screen. The HS_25 function block will pop up as shown in the following screenshot.



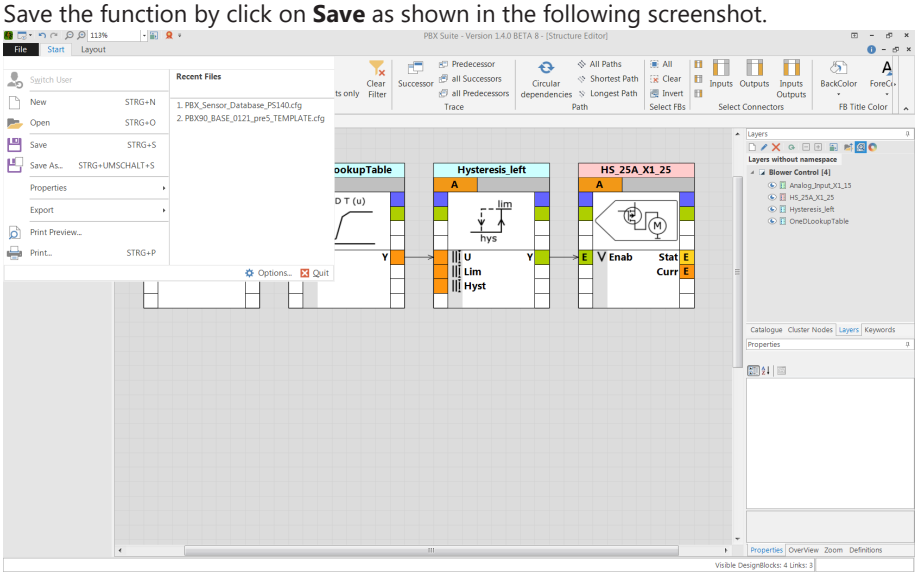
21. With double-click on the selected function block you open the pin assignment wizard. Select Output X3_B from the pull down menu, similar to step 9.



22. Connect the square angles of the function blocks by pulling lines as shown in the following screenshot.



23. Save the function by click on **Save** as shown in the following screenshot.



Congratulations! You have programmed your first function!

Further steps

After creating the configuration, you got the following options:

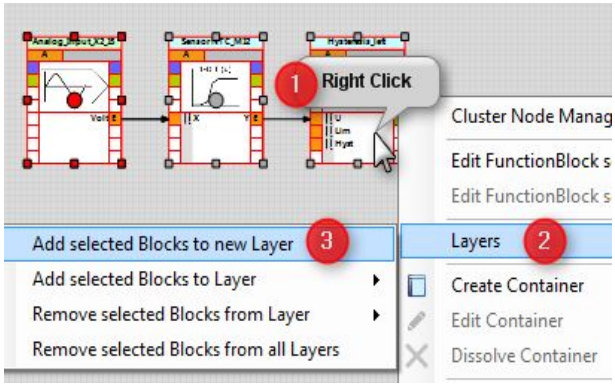
- transfer and activate the configuration to the PowerBox PBX 190 with PowerBox Manager,
- follow the signal values with PowerBox Manager,
- use the automatically generated *.prg file for RaceCon to measure, record and analyze, see also Integration to RaceCon [▶ 35].

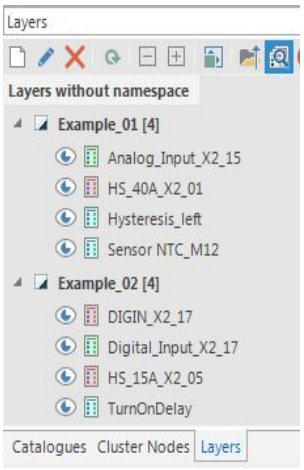
Please visit our website bosch-motorsport.com for more information on how to work with the PBX suite.

4.5 Structuring of complex configurations

4.5.1 Layer

Use **Layer** mechanism for logically grouping of Function Blocks.



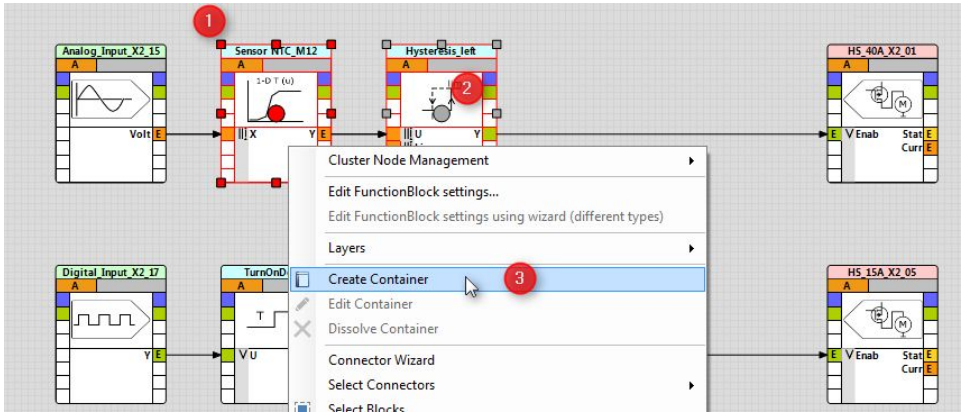


Function Blocks can belong to several Layers.

Layers are supported by the View Online Data of the Powerbox Manager allowing an easy filtering for the data of interest.

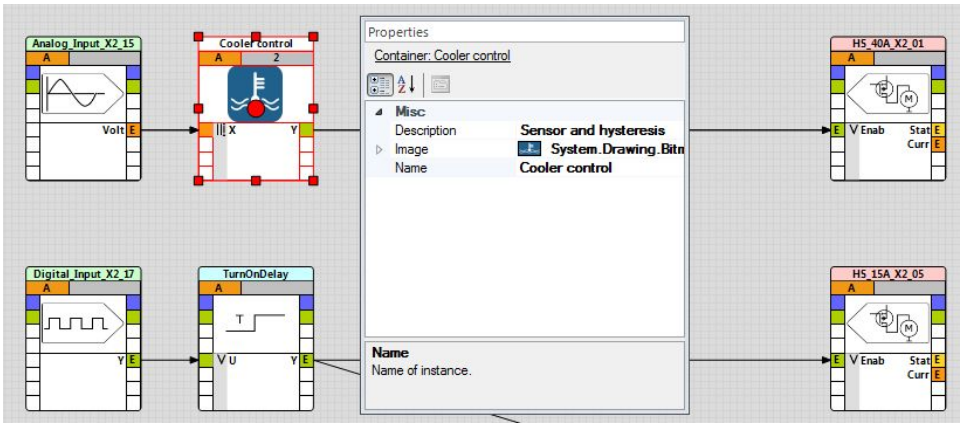
4.5.2 Container

1. Select two or more function blocks.
2. Right click on a selected function block to open the context menu
3. Select Create Container



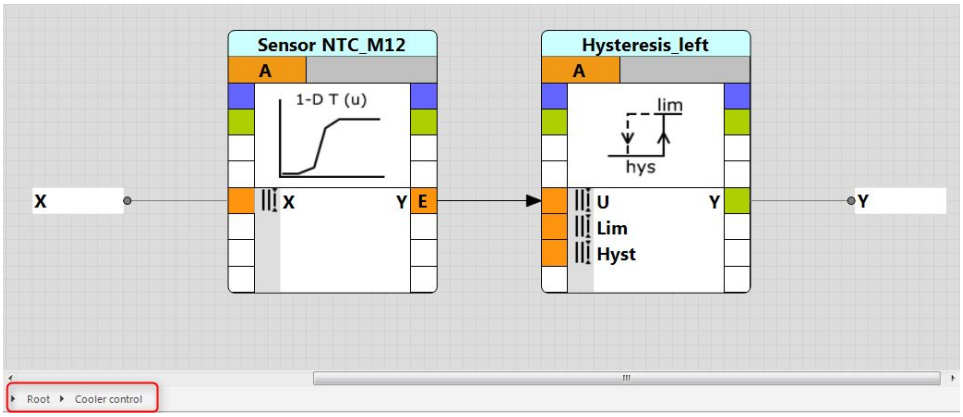
A Container block appears which is connected to the environment.

In the properties tab a description, an image or an alternative name can be setup.



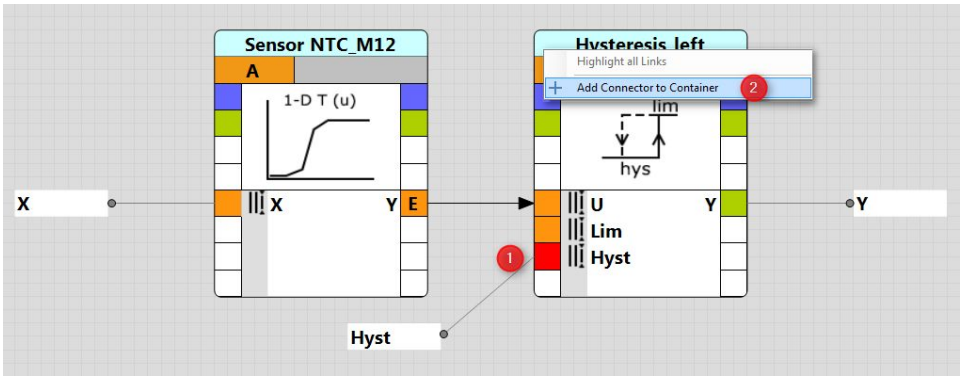
Double clicking the Container switches inside the container, showing the included functionblocks and the outside connections.

Navigation to the outside is done in the lower left corner.



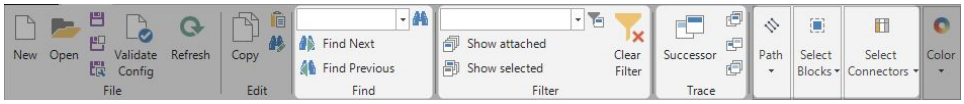
A further outside connection can be generated by

1. Right clicking on an in- or output port,
2. Select Add Connector to Container.



4.6 Utilities for navigating through complex configurations

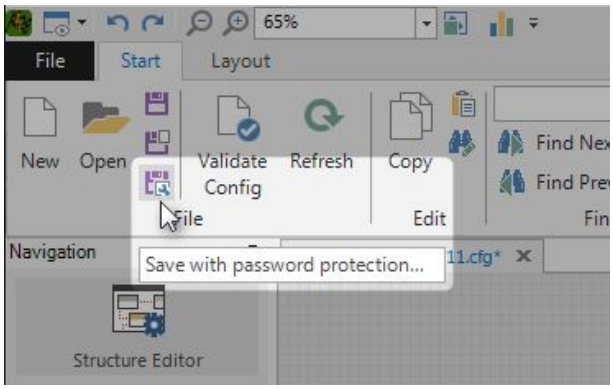
At the **Ribbon** bar several functions assist for finding, filtering, tracing and selecting of Function Blocks in complex configurations



4.7 Password protecting a configuration

Protecting a configuration with a password can be done by clicking the Button 'Save with password protection'.

Enter the password and confirm it.



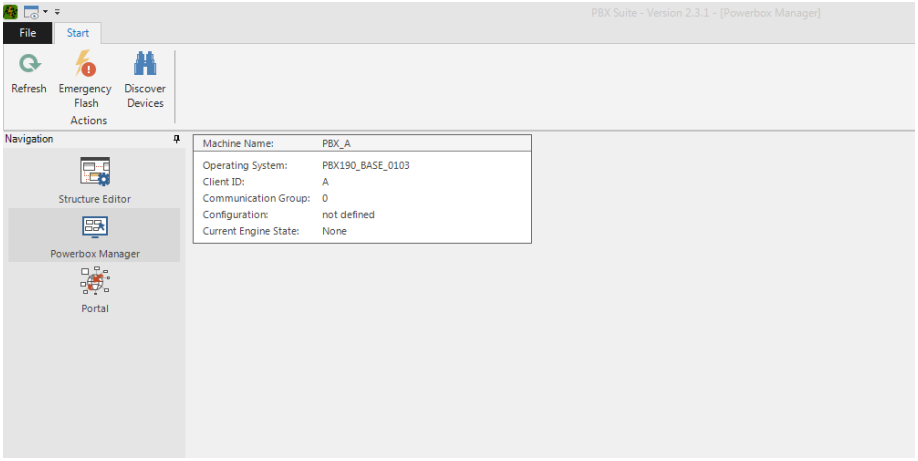
From now on the correct password has to be entered to open this configuration.

5 First Upload of a configuration

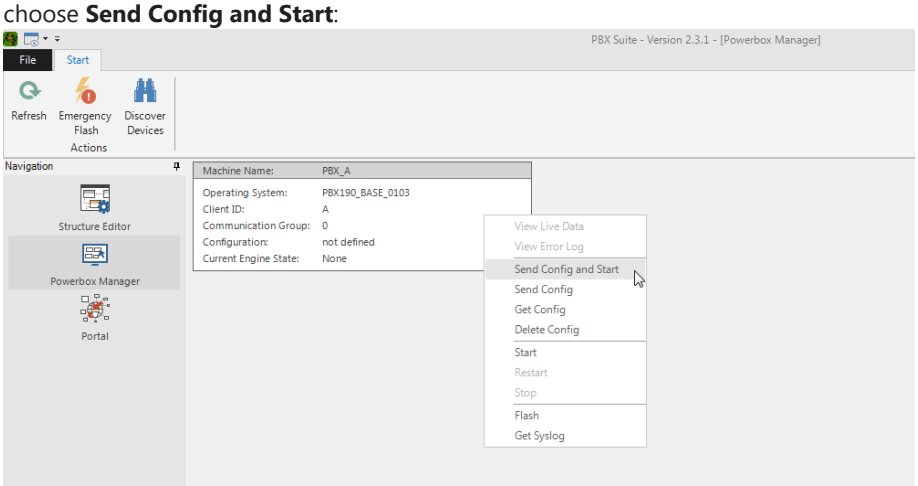
This chapter will show how to upload the new designed configuration file to the PowerBox.

1. Connect your computer and the PowerBox via Ethernet.
2. Activate your PowerBox.
3. Start your PBX Suite and activate the PowerBox Manager by clicking on the button as shown in the following screenshot:

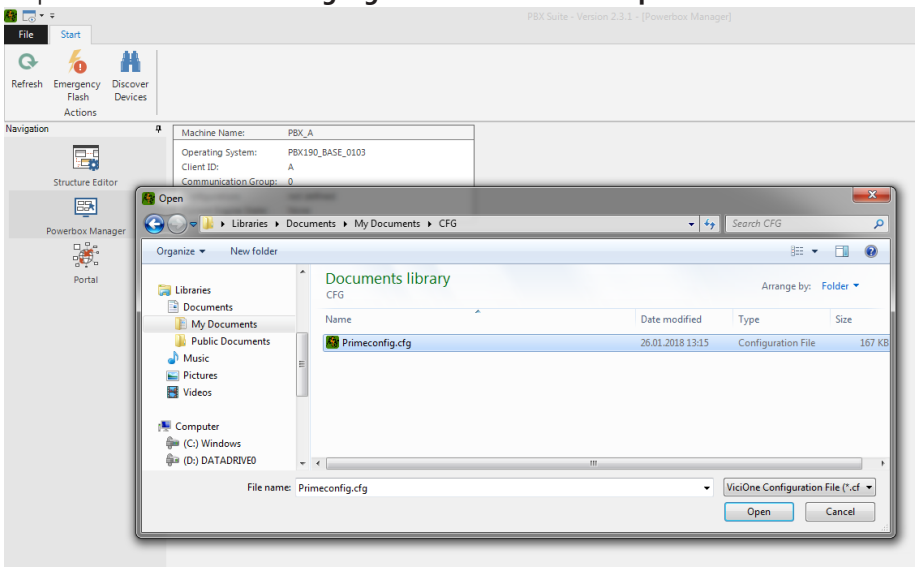
4. After a short while the screen will show your device:



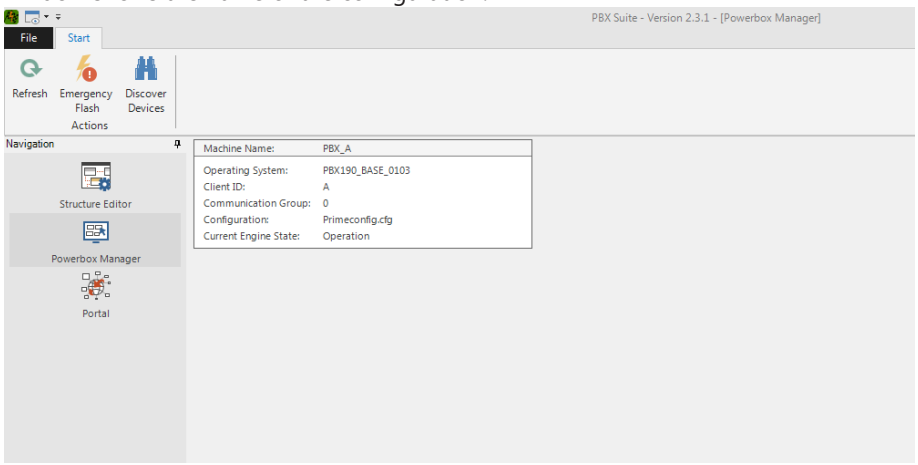
5. Now you can transfer the config file. Therefore right-click on the device window and choose **Send Config and Start**:



6. Choose the configuration file which you want to put on your PowerBox. In this example it is named **Primeconfig.cfg**. Confirm with click on **Open**.



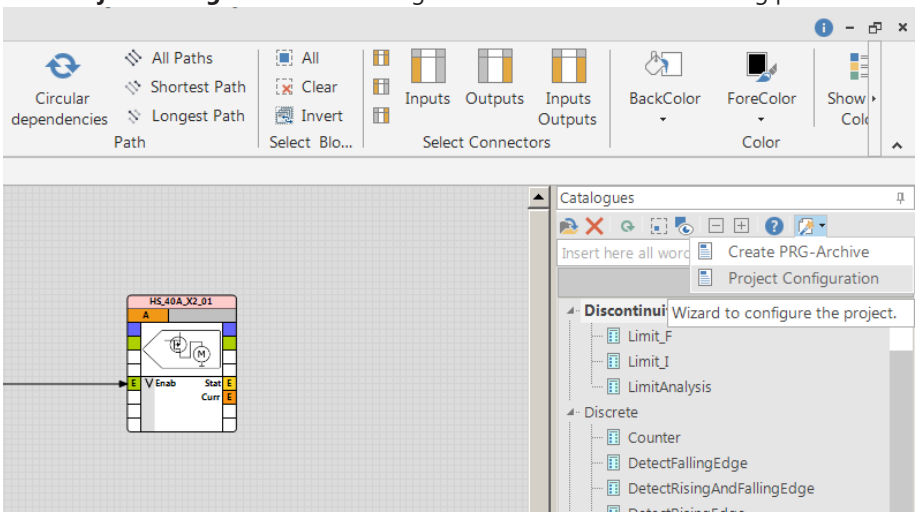
7. The config file was put on the PowerBox, and after an automatically restart the device window shows the name of the configuration:



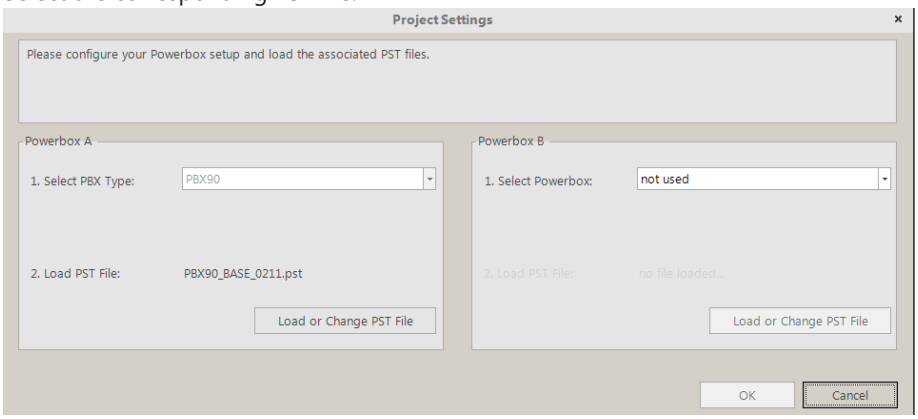
6 Update of an existing configuration

This chapter will show how to update a configuration.

1. Click **Project Configuration** on Catalogue tab as shown in the following picture.



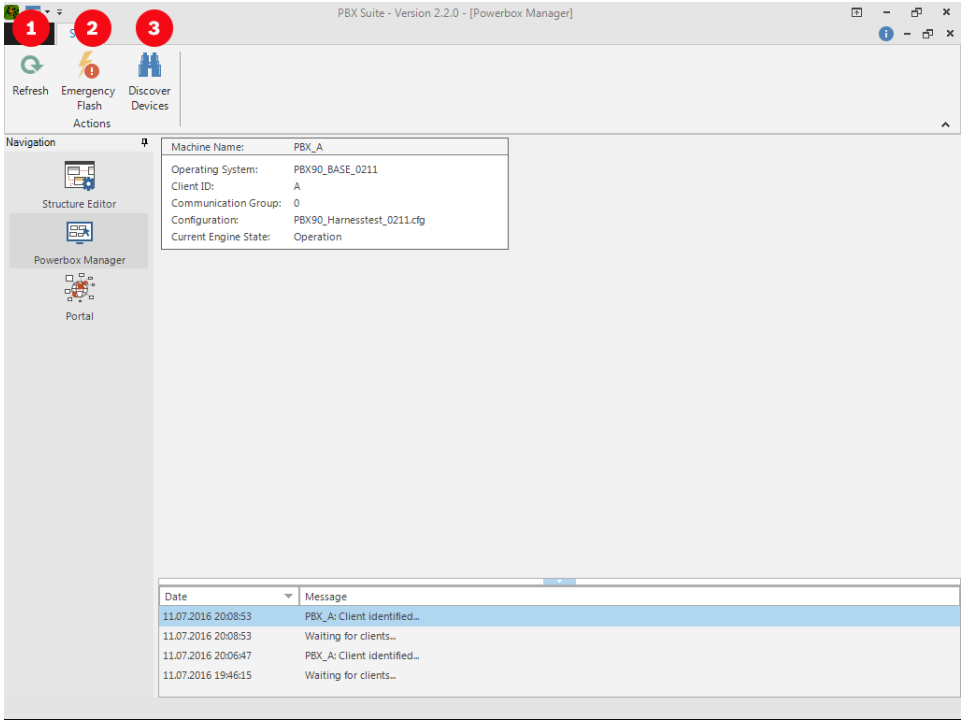
2. Select the corresponding PST file.



3. Confirm by clicking **OK**.

7 The Powerbox Manager

The Ribbon Bar

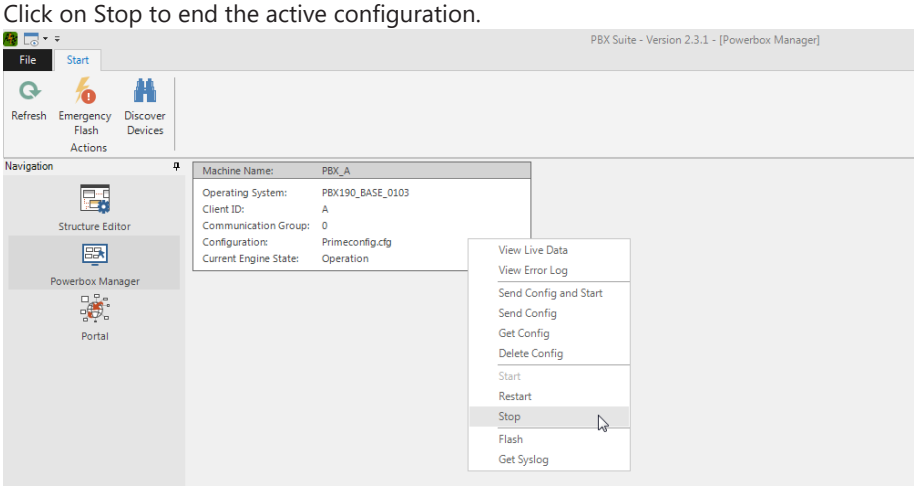


1. Refresh: Updates the current view
2. Emergency Flash: Allows to Flash a device which has entered the emergency state
3. Discover Devices: Used to assign in a double-PBX system the 2nd PBX device a different allocation

7.1 Switch between configurations

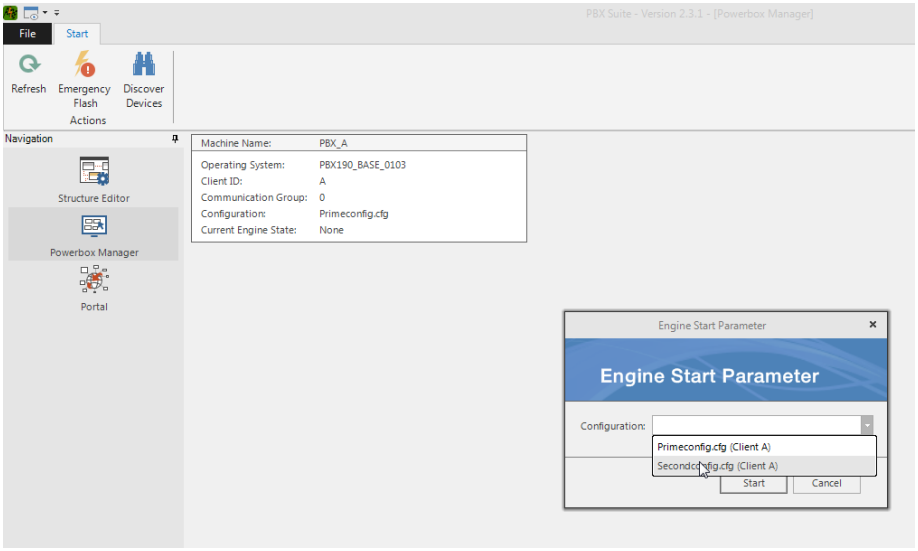
This chapter will show how to switch between different configurations on your PowerBox.

1. Right mouse click on the device window will open the menu as shown in the following screenshot.
2. Click on Stop to end the active configuration.

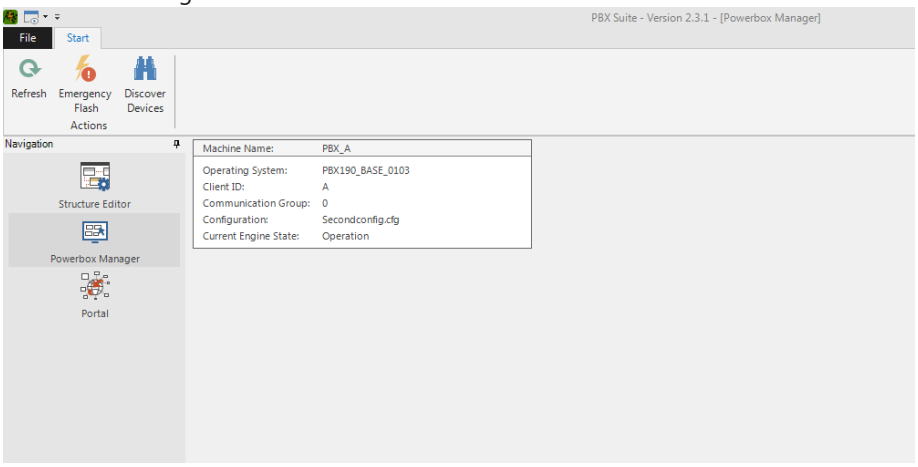


3. Click Start to choose the new configuration.

4. Choose the new configuration from the pull down menu, here “Secondconfig.cfg”. Confirm with click on Start.

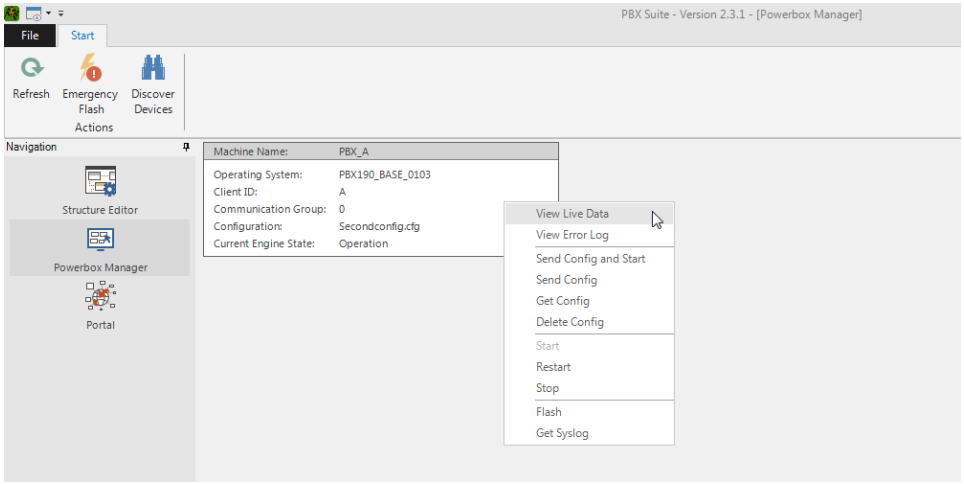


5. The device will restart and after a short time the device window shows the name of the second configuration.

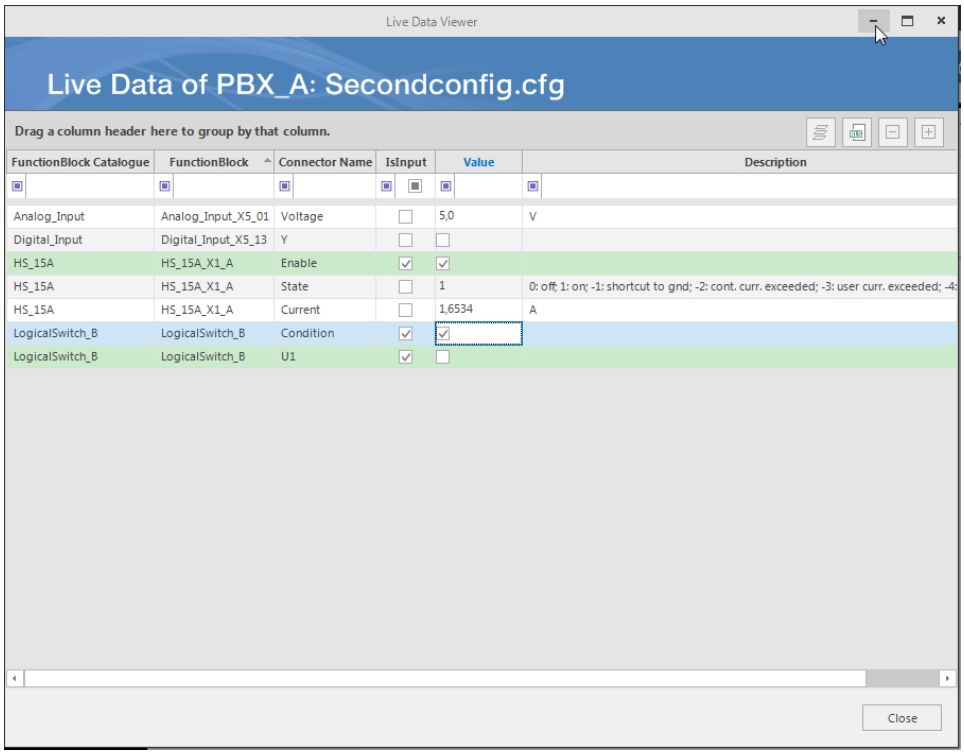


7.2 View Live Data

This chapter will show how you can view live data with your PowerBox Suite. Right click on your device opens a window where you choose View Live Data.



Now you can see the entire Event enabled data on your screen.



Every in- or output port of the Function Blocks checked for EventEnabled is represented as a row.

For output ports the current value is shown, some with additional Description information.

For input ports it is possible to affect the operative value. The result is controlled by the selected PoolingMode.

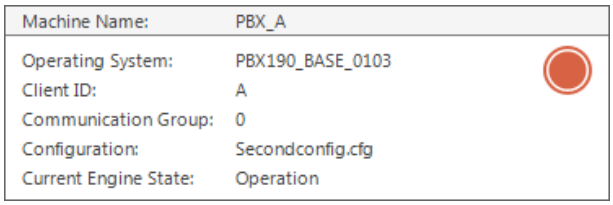
Various support for filtering the amount of data is provided, including the support for Layers.

7.3 Error log

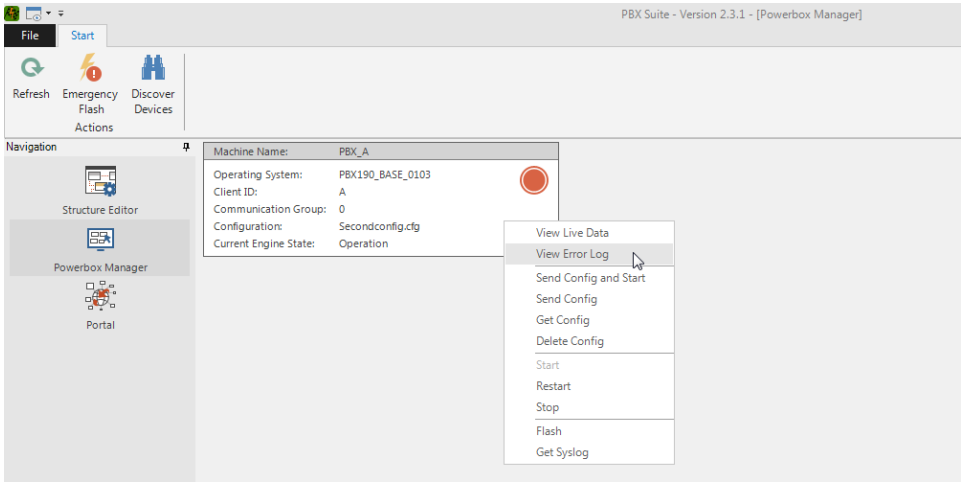
A red dot in the upper right corner of the box indicates if the error log contains at least one entry.

If blinking, at least one active error entry is present.

Else only passive error(s) are present.

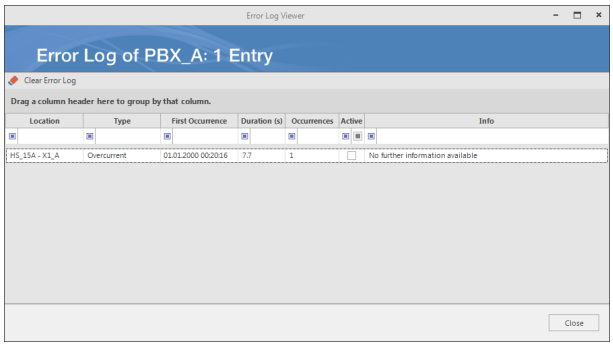


In the context menu select „View Error Log“ to view the error log entries.



Besides the location and type further information are available.

To clear the error log, click „Clear Error Log“ in the upper left corner of the error log window.



The Error Log can also be accessed with RaceCon.

RaceCon also provides access to the following measurements variables:

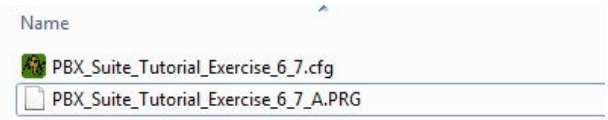
- General Error Log Status (device measurement label “error_state”)
  - No error present in memory
  - At least one inactive error present in memory, no active errors
  - At least one active error present in memory
- Error type (device label “error_type_rotate”)
  e.g. “below_threshold” for a violation of the minimum voltage range defined in the configuration, “shortcut_Batt” for a shortcut to battery voltage etc.

- Error location (device label “error_location_rotate”)
  e.g. “ANA01” for an error concerning the first ANA channel
- Error active state (device label “error_active_rotate”)
  All failure modes are continuously diagnosed; any error detected will be written to the error memory. Once an error is detected, it is qualified as “active”.
  - 1 (TRUE) Error was detected in most recent diagnose run (active)
  - 0 (FALSE) Error is inactive: error was not detected in most recent diagnostic run, however the error has not been cleared from the memory by the user and remains in the non-volatile memory

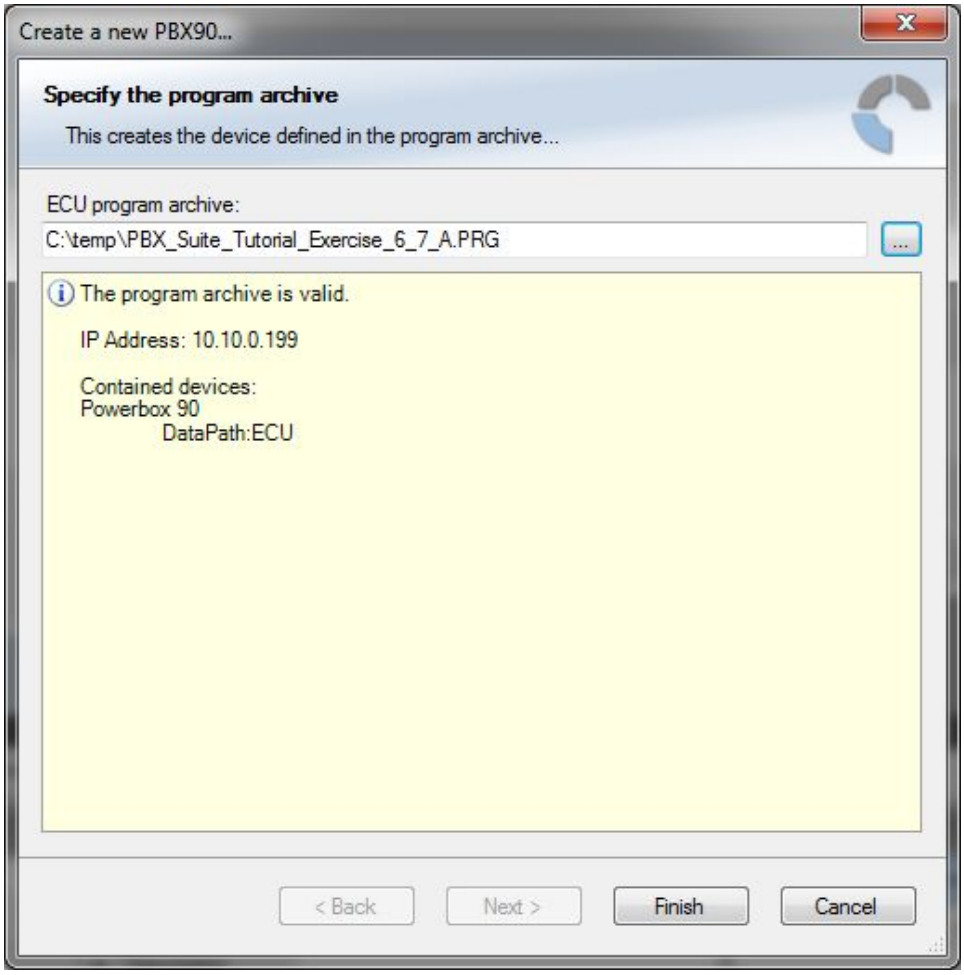
The aforementioned labels (error_active_rotate, error_location_rotate, error_type_rotate) cycle through the errors currently present in the memory and represent the respective property of each error periodically.

8 Integration to RaceCon

At the same location the Configuration is saved, an additional export file for RaceCon is written. It is suffixed by an ‚_A' or ‚_B' and the extension is ‚PRG':

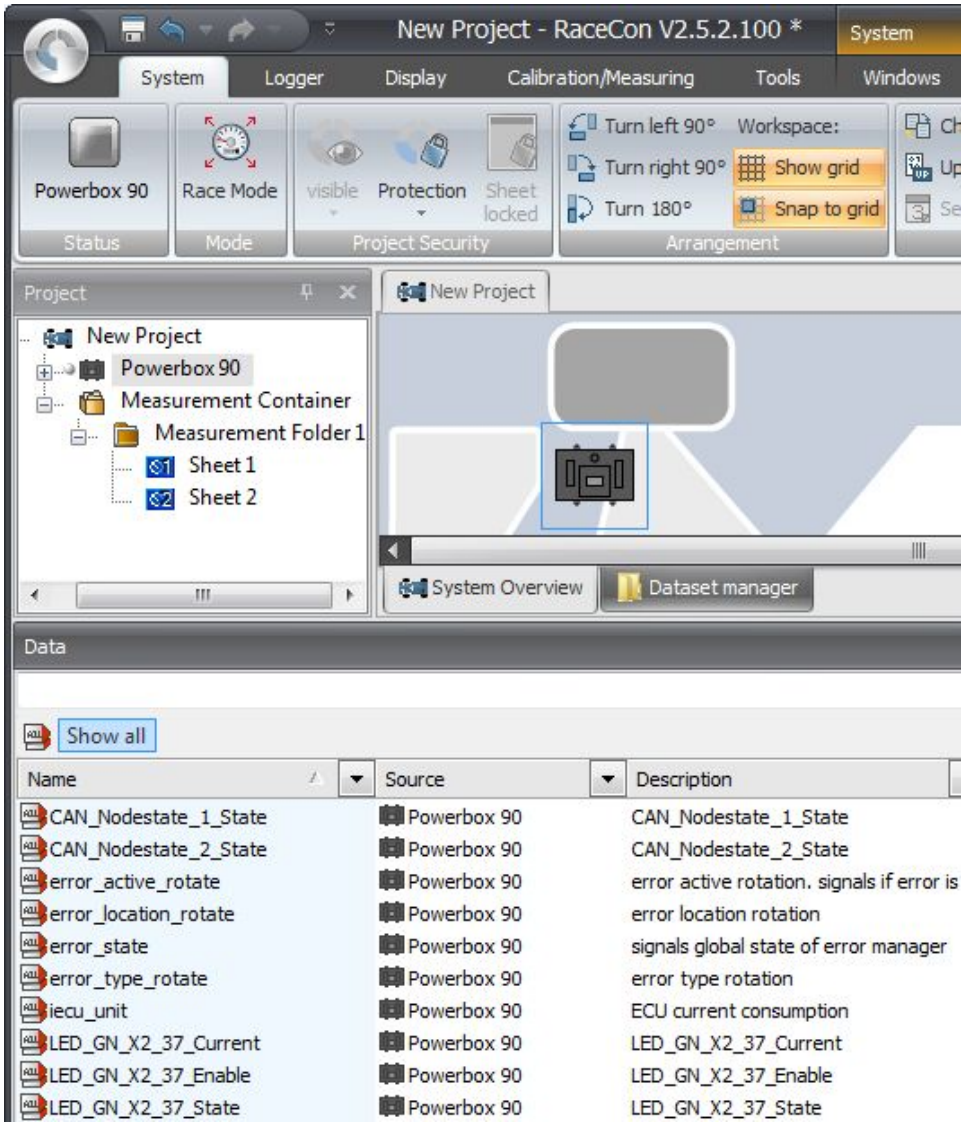


Drag & Drop a PowerBox PBX 190 in RaceCon into the project and select this ‚PRG' file if asked for the program archive:



All the In- and Output Ports of the configuration with EventEnabled set to True are now available and can be used for

1. Logger
2. Display
3. Measuring


New Project - RaceCon V2.5.2.100 *
System
System
Logger
Display
Calibration/Measuring
Tools
Windows
Powerbox 90
Race Mode
visible
Protection
Sheet locked
Turn left 90°
Turn right 90°
Turn 180°
Workspace:
Show grid
Snap to grid
Status
Mode
Project Security
Arrangement
Project
New Project
Powerbox 90
Measurement Container
Measurement Folder 1
Sheet 1
Sheet 2
New Project
System Overview
Dataset manager
Data
Show all
Name
Source
Description
CAN_Nodestate_1_State
CAN_Nodestate_2_State
error_active_rotate
error_location_rotate
error_state
error_type_rotate
iecu_unit
LED_GN_X2_37_Current
LED_GN_X2_37_Enable
LED_GN_X2_37_State
Powerbox 90
error active rotation. signals if error is
error location rotation
signals global state of error manager
error type rotation
ECU current consumption

9 FAQ

You'll find an FAQ list on the PowerBox product site of bosch-motorsport.com.

10 Disposal

Hardware, accessories and packaging should be sorted for recycling in an environment-friendly manner.

Do not dispose of this electronic device in your household waste.

11 Technical Specifications

Mechanical Data

Size	245 x 183 x 37 mm
Weight	1,270 g
Protection Classification	IP67
Internal G-sensors	
Temp. range (at internal sensors)	-20 to 85°C

Electrical Data

Supply voltage range	5 to 16 V
Current consumption	<1 A continuously
Maximum recommended output current	250 A continuously; >310 A peak current (2 s)

Communication

CAN	3
Ethernet	2
LIN	1 Control of Bosch Motorsport LIN devices included. Support of other devices on request.
Real time ethernet Sercos (optional)	2

Inputs

18 analogue inputs (16 bit resolution) switchable pull-up resistors
10 digital inputs switchable pull-up/pull-down resistors

Outputs

4 high power channels up to 40 A (parallel up to 80 A)
10 high power channels up to 25 A
26 high power channels up to 15 A
4 high side channels up to 25 A, up to 48 V
8 multi-purpose outputs up to 15 A (low side, high side, push-pull, PWM; two output stages can be combined to form an H-bridge)
2 sensor supplies 5 V with individual ground pin

Software

Function development and calibration tool	Bosch Motorsport PBX Suite

12 Open Source Software (OSS) declaration

12.1 Sensor Driver for BMI160 Sensor

Applies to BMI160

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