



EUROSWITCH
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SCD4.0

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Introduction

SCD (Sensor Configurator Device) is a device developed to communicate and modify the configuration of Euroswitch electronic sensors. The device must be connected to a pc using the software SCD.exe that can be downloaded in reserved area of www.euroswitch.it.

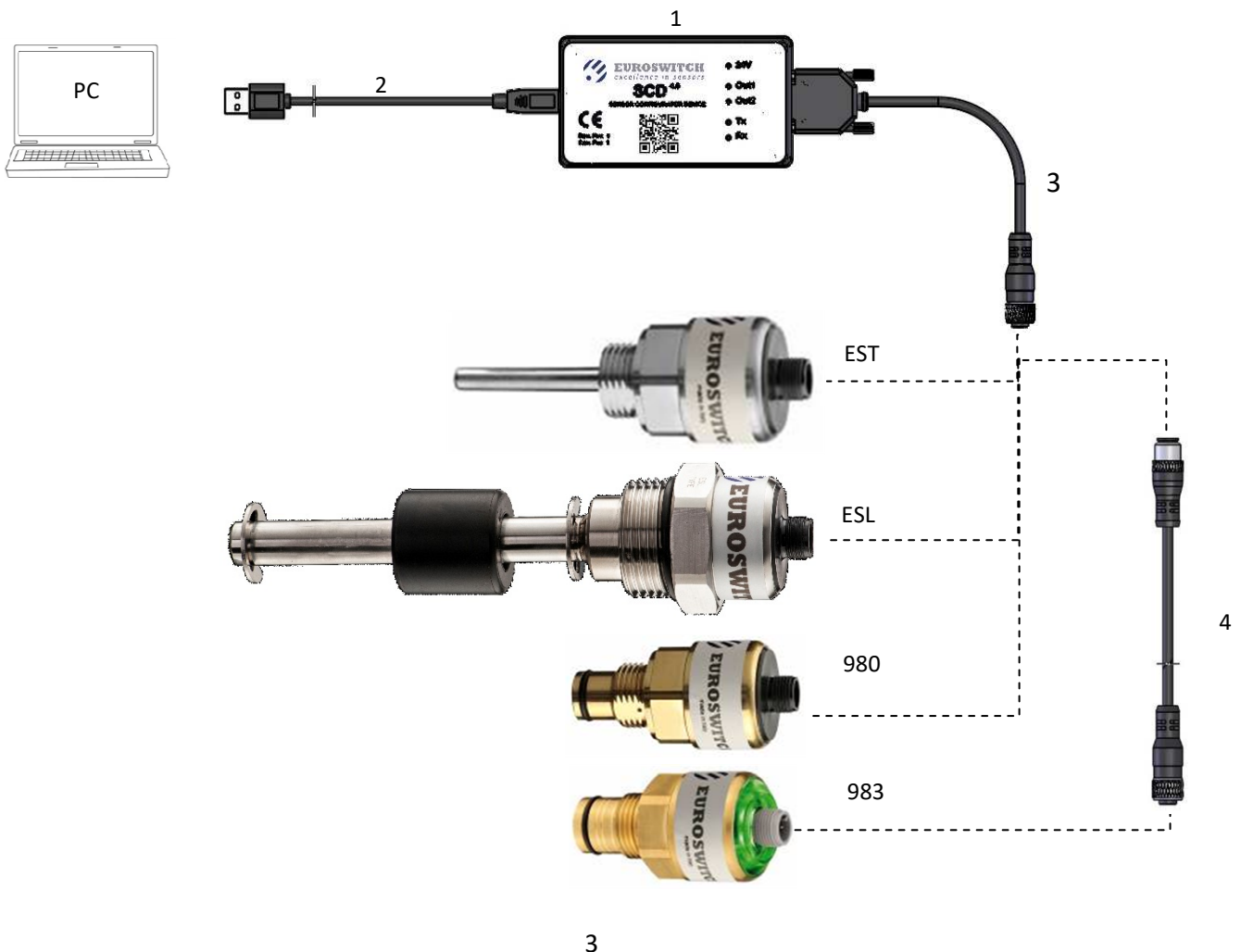
SCD rev 1.0 software allows reading and modifying some configuration parameters of the following sensor models:

- **EST**: temperature sensors with one analog output 4-20 mA and two pnp digital outputs;
- **ESL**: level sensor with one analog output 4-20 mA and 2 two pnp digital outputs;
- **980**: differential pressure sensor with one analog output 4-20 mA and 2 two pnp digital outputs;
- **983**: differential pressure sensor with colour indicator and two pnp or npn digital outputs;

Hardware description

The device is composed by:

1. Interface board
2. USB A / USB B cable
3. Dsub 9 / M12 male cable
4. M12 female / M12 male cable



Interface board

The interface board is connected to a pc using Usb A / Usb B cable and to an ESL, EST or 980 sensors using Dsub 9 / M12 male cable; when a 983 sensor is connected the M12 female / M12 male cable must be added as shown in the previous figure.

In front panel of interface board some leds are present:

- 24V: turns on when the sensor is powered;
- Out1 / Out2: show the state of the digital output of the connected sensor;
- Tx / Rx: blink when communication with the sensor is active.

Software SCD.exe

Description and requirements

Scd.exe is software developed by Euroswitch in order to read and modify some configuration parameters and verify the behaviour of the connected sensor.

The software is designed for Microsoft operating system Windows 7 or later; when previous versions are used, suitable version of drivers must be installed previously.

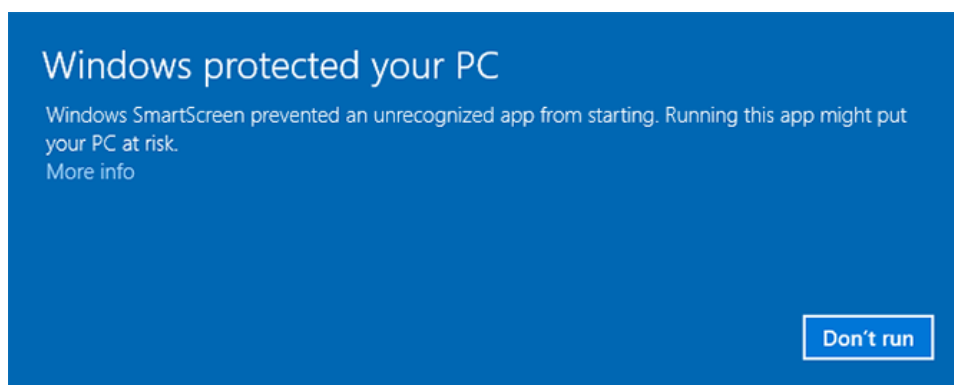
Minimum monitor resolution is 1024x768.

Installation

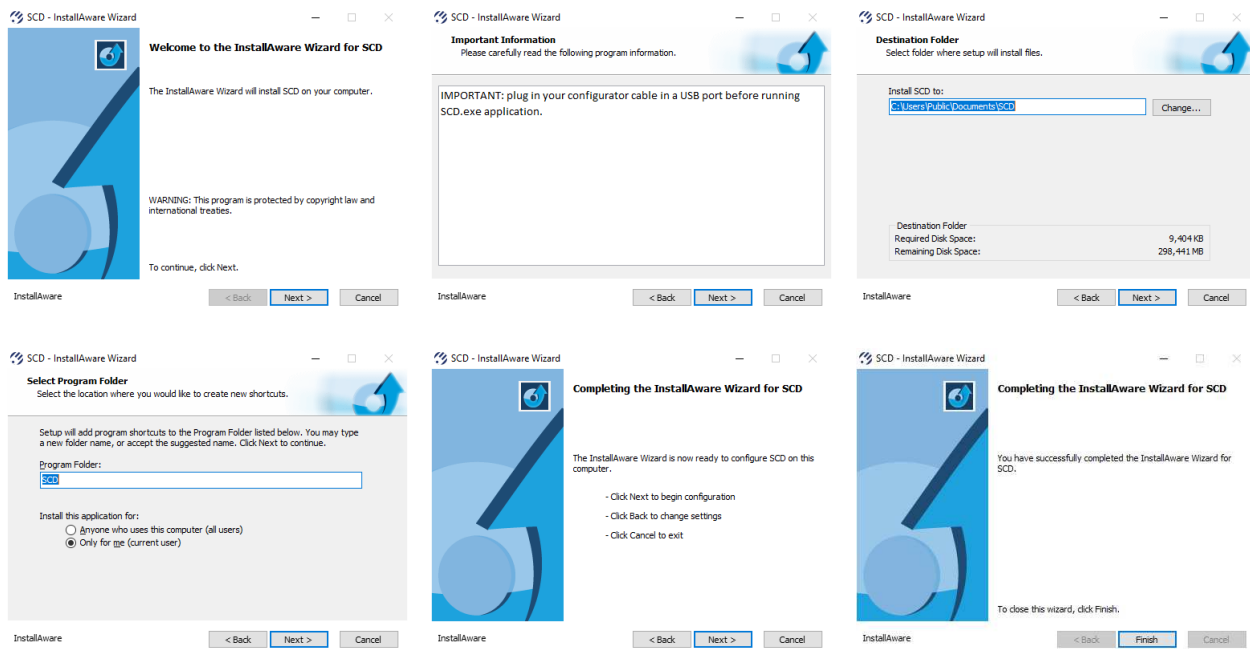
Scd.exe software can be downloaded from reserved area of www.euroswitch.it.

It is recommended to start installer *ScdSetup.exe* with administrator privileges.

In Windows 10 systems, the installation of new software is guarded and the following window is shown



Select "More info", then "Run anyway" and follow the installation steps.



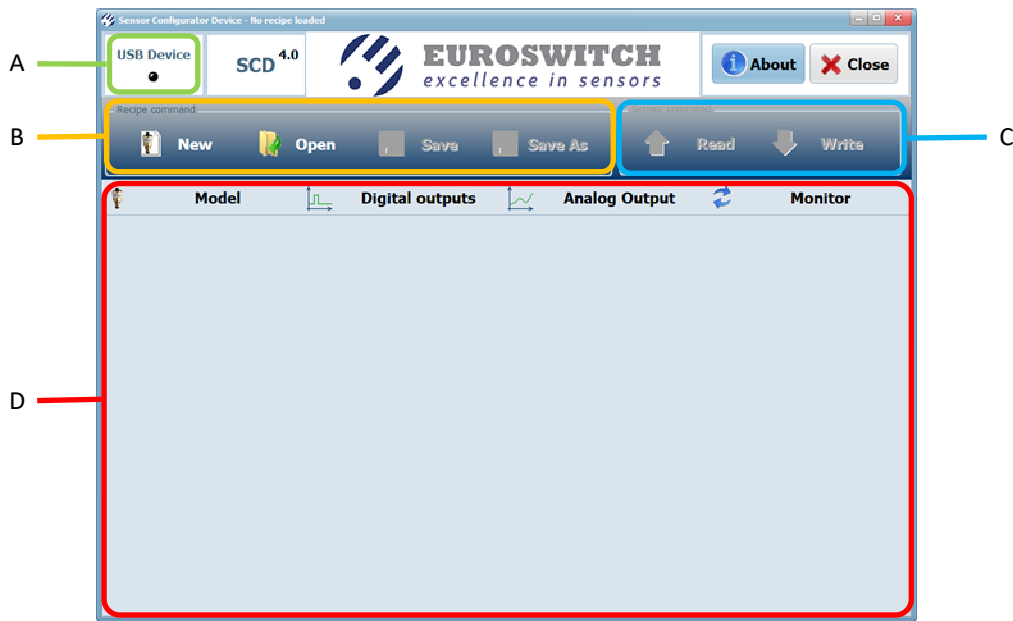
Before running Scd.exe software, it is recommended to connect the interface board to the pc using Usb A / Usb B cable in order to allow the operating system to configure the usb port.

General description

When software is started, alter the visualization of the presentation splash screen,



the main screen is displayed:



The main screen is divided in some areas:

- A. USB Device: this area shows the state of the connection of the pc with the interface board: blinking green light if the connection is active, blinking red light if there is no connection;
- B. Recipe command: this area is dedicated to the recipes management; a recipe is the set of parameters that defines the behaviour of a sensor and can be stored in a file. The buttons allows to:
 - **New**: create a new recipe;
 - **Open**: open a recipe previously saved to a file;
 - **Save**: save the current recipe in the opened file;
 - **Save As**: save the current recipe in to a different file;
- C. Sensor command: the buttons of this area are used for read from or write to the sensor all the parameters of the current recipe;
- D. This area shows all the information about the recipe and the connected sensor, the information are divided in four tabs (**Model**, **Digital outputs**, **Analog output** and **Monitor**) and some of them change when a different sensor type is selected.

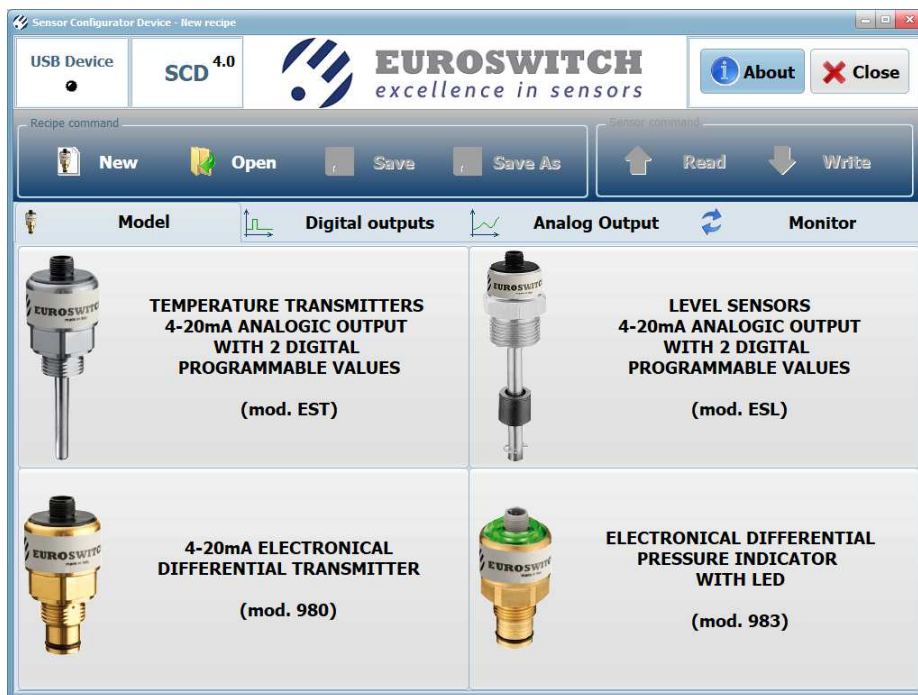
How to use

In the following the main functionalities are described.

Read the configuration from a sensor

Press **New** to start operating with a new recipe.

The **Model** tab shows the types of sensor that is possible to communicate to, the user must select one of them.



Tabs **Digital Outputs** and **Analog Output** show all the parameter that the software can read or write for the selected sensor type. For some sensor types the user is asked to select some further sensor features as described in the relative sections.

If the connection with the interface board is active (USB Device blinking green) buttons **Read** e **Write** of the Sensor command area are enabled.

Click the button **Read** to load all the parameter from the sensor connected to the interface board. When read phase is finished (few seconds) tabs **Digital Outputs** and **Analog Output** are updated.

Modify the configuration of a sensor

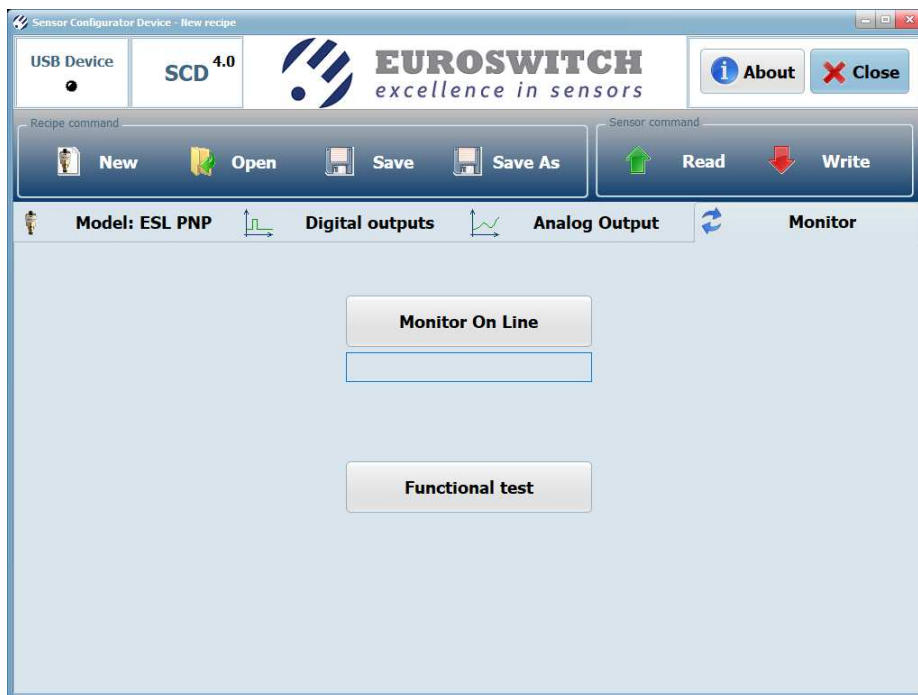
The parameters of a recipe (read from a previously saved recipe or from a sensor) can be modified acting on controls of **Digital Outputs** and **Analog Output** tabs.

Pressing **Write** button all the parameters are written on the sensor connected to the interface board.

CAUTION: this operation overwrite permanently the parameter of the sensor, previous values can't be restored any more. If needed we suggest saving a copy of the sensor parameters before overwriting: press **Read** button and save the recipe with **Save** or **Save As** buttons.

Monitor function

Selecting the **Monitor** tab, that is enabled only if one sensor type is selected and the interface board is connected, the following screen is displayed:



Clicking on **Monitor On Line** button, depending on the sensor type, some parameters are continuously read:

- **EST**: temperature and current of the analog output;
- **ESL**: current of the analog output;
- **980**: current of the analog output;
- **983**: measure differential pressure;

Before executing other operations, **Monitor on line** function must be stopped pressing **Monitor On Line** button again.

Clicking **Functional Test** button only power supply to the sensor is activated (no parameter is read from the sensor). Three seconds after power is turned on, the state of the digital outputs of the sensor drive the leds **Out1** and **Out2** on the front panel of the interface board. In this operating mode it is possible to verify the actual operation of the sensor.

Before executing other operations, **Functional Test** must be stopped pressing **Functional Test** button again.

Error messages

When **Read**, **Write** or **Monitor On Line** operations are executed, if it is not possible to set a connection with the sensor, the following message is visualized:



In this case, check the right insertion of the connectors and if the cables are suitable for the connected sensor type.

If a connection was set but the sensor type doesn't correspond to the recipe one, the following message is visualized:



If some error on the USB port connection occurs, the following message is visualized:

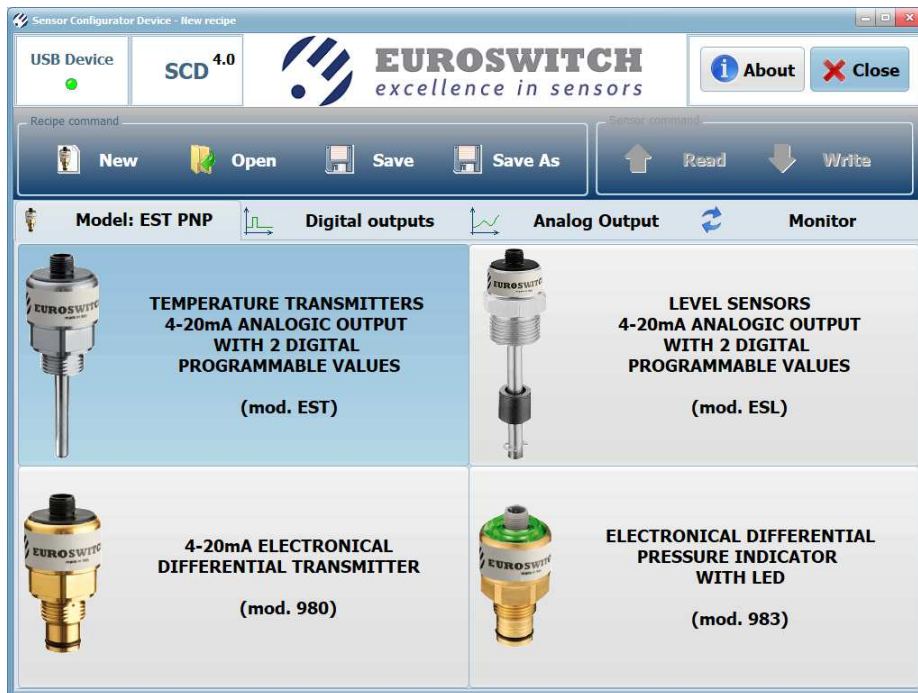


In this case, *Scd.exe* application must be closed and started again in order to restore the communication with the interface board.

Some other error messages relative to a particular sensor type are described in the following paragraphs.

Configuration of EST sensor

In the *Model* tab select the EST type.



When another tab is selected, the user is asked to choose if the EST sensor have only the temperature indication (*Without level*) or if the sensor have also floats for level threshold indication (*With level*).



EST Digital Outputs



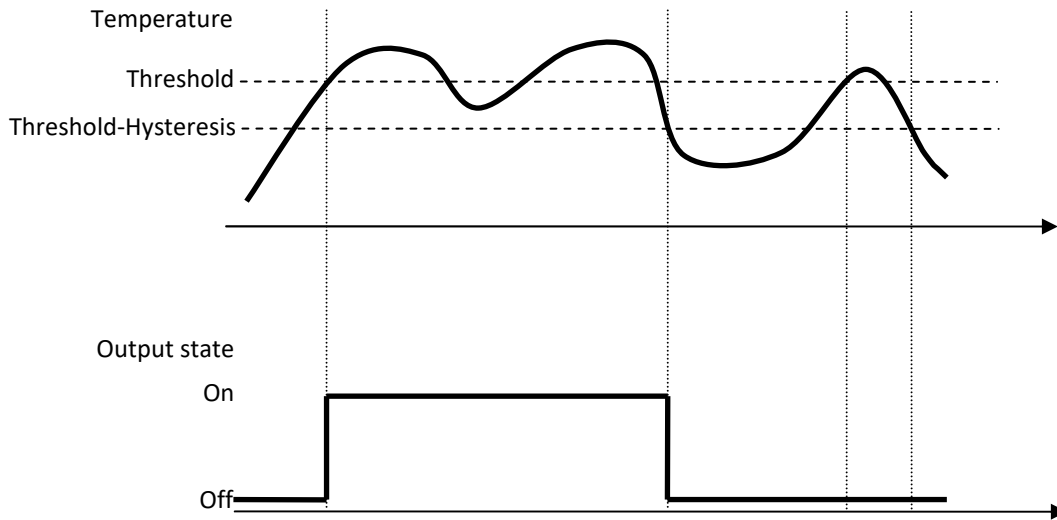
For each of the two digital outputs of the sensor (**Output 1** and **Output 2**) it is possible to set the following parameters:

- **Configuration:**
 - **Normally Off:** the digital output state is OFF if the temperature is below the threshold and ON if the temperature is above the threshold;
 - **Normally On:** the digital output state is ON if the temperature is below the threshold and OFF if the temperature is above the threshold;
- **Threshold (°C):** temperature threshold value;
- **Hysteresis (°C):**
 - If the configuration is set to **Normally Off**, the digital output turns OFF when $\text{Temperature} < \text{Threshold} - \text{Hysteresis}$.
 - If the configuration is set to **Normally On** the digital output turns ON when $\text{Temperature} < \text{Threshold} - \text{Hysteresis}$.
- **Delay (s):** the digital output changes its status if the conditions maintain for a period $> \text{Delay}$.

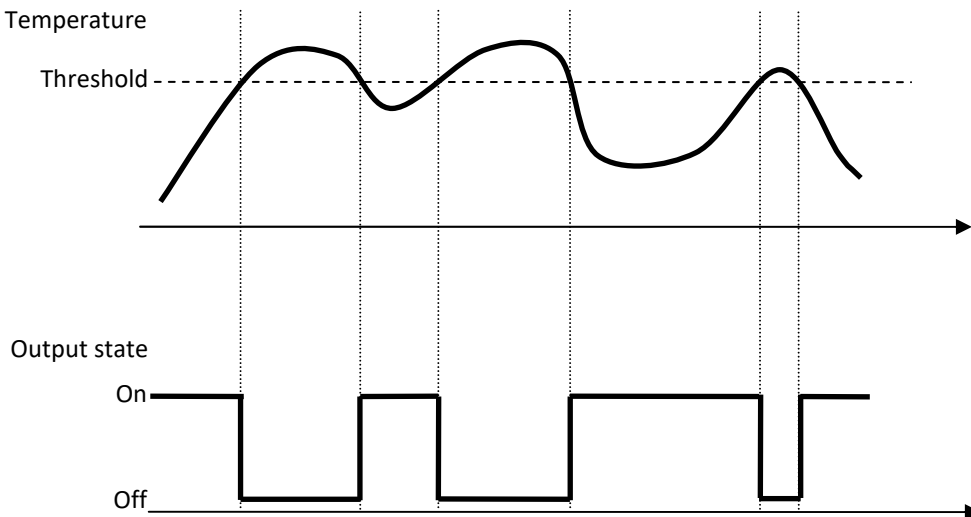
Figures in the central part of the screen update according to the selected configuration (**Normally on** or **Normally off**).

The behaviour of the sensor for different parameters selection is displayed in following explanation graphs.

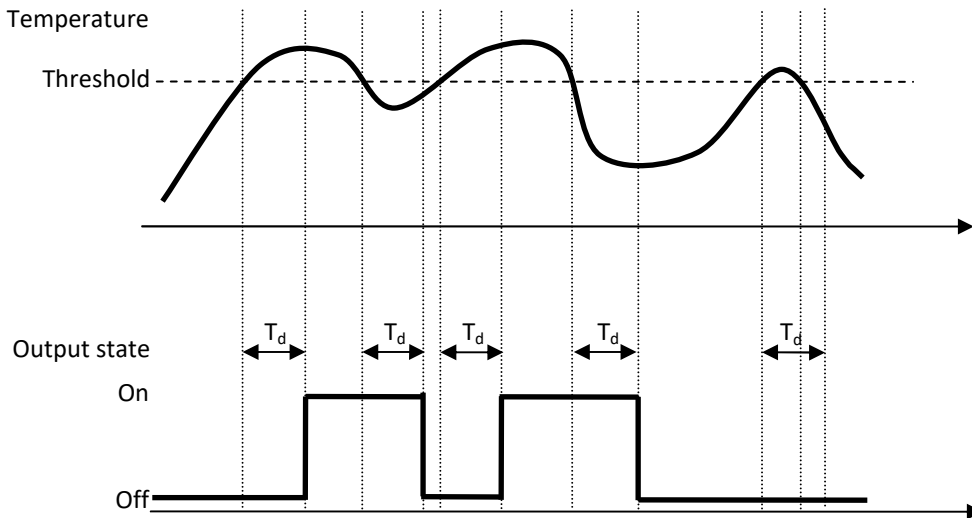
Normally off, Hysteresis>0, Delay=0



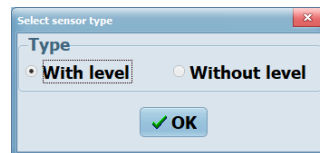
Normally on, Hysteresis =0, Delay=0



Normally off, Hysteresis = 0, Delay = T_d



If the sensor has floats for level indication, the choice *With level* must be selected.



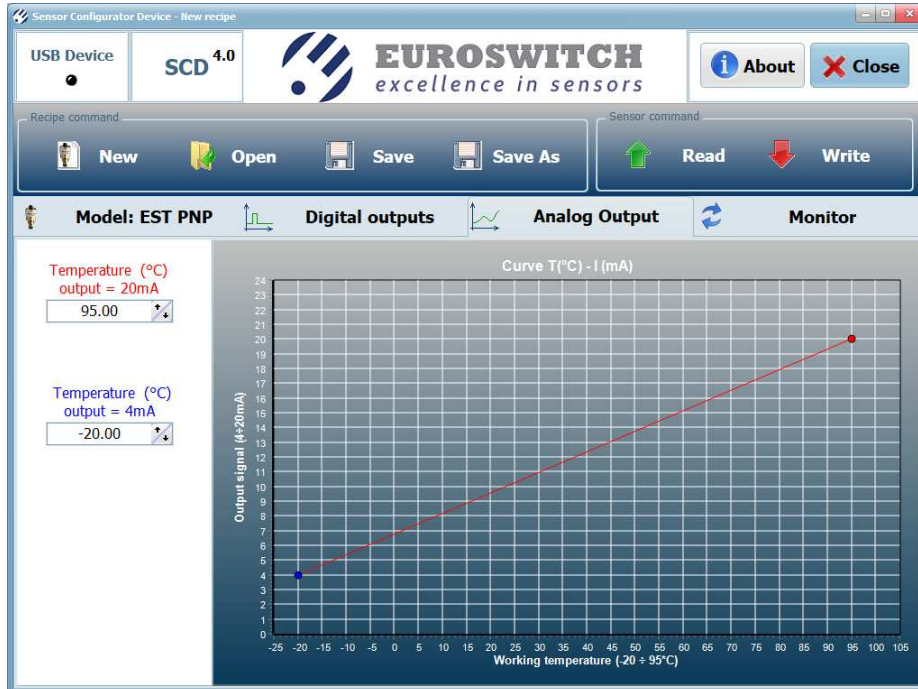
In this case, it is possible to choose if the digital outputs state is determined by the temperature or by the floats state.



For this type of sensor floats have preset limited stroke, so they can only indicate if the liquid reaches a predefined threshold level that can't be modified; only *Delay* time can be set.

EST Analog Output

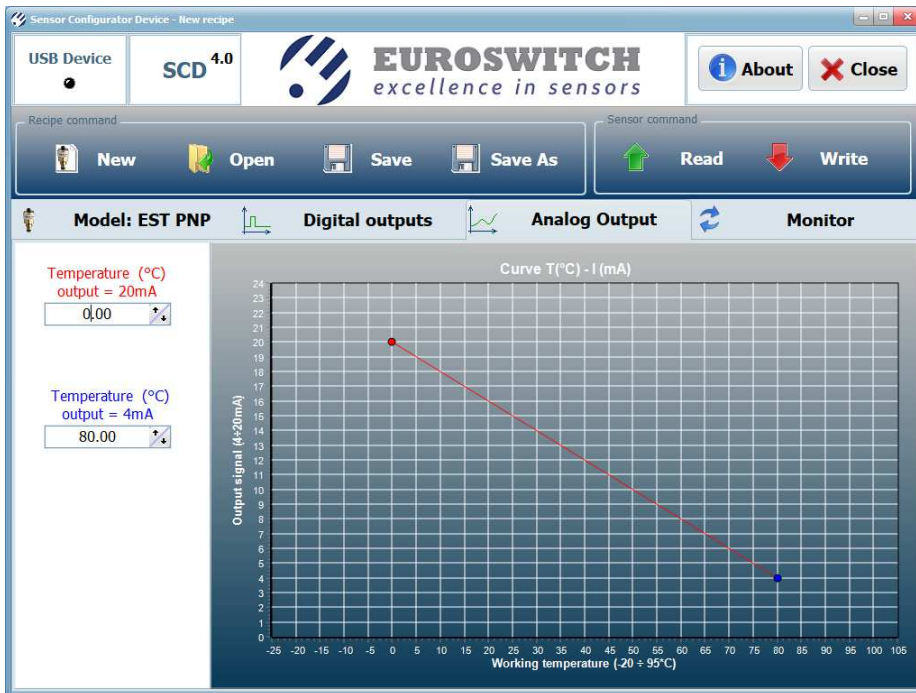
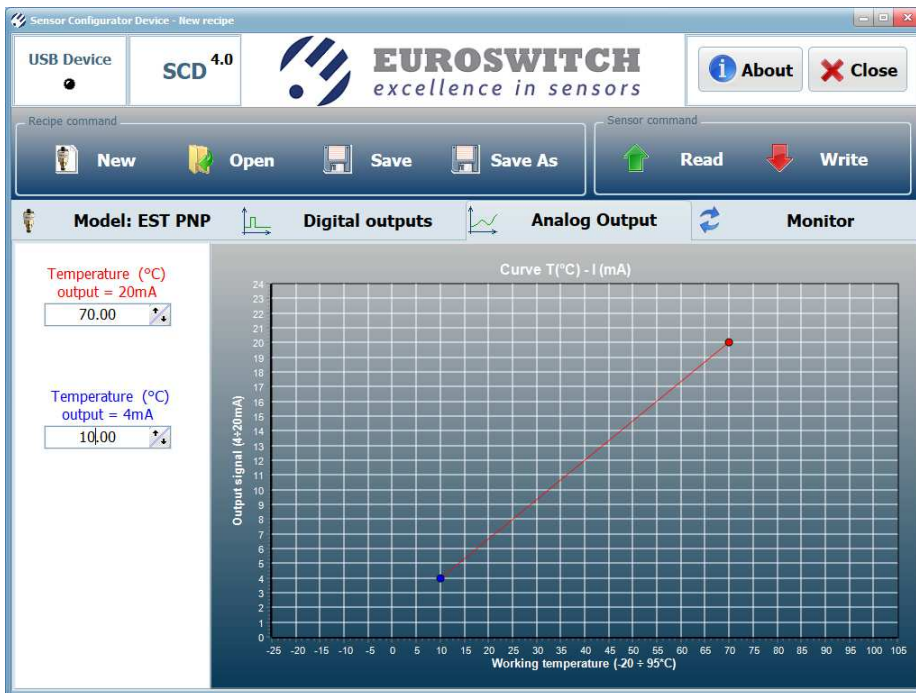
Selecting **Analog Output** tab the user can modify the output curve, i.e. chose the linear relation between measured temperature and output current.



Working temperature of the sensor is limited to the range $-20 \div +95^{\circ}\text{C}$, minimum output current is fixed to 4 mA, maximum output current is fixed to 20 mA.

The output curve can be set editing the values of the temperature corresponding to 4 and 20 mA output or dragging ending points of the curve on the graph. A minimal difference of 10°C between lower and upper temperature values must be kept.

Some examples of settable curves are displayed in the following.



ESL sensor configuration

In the *Model* tab select ESL type.

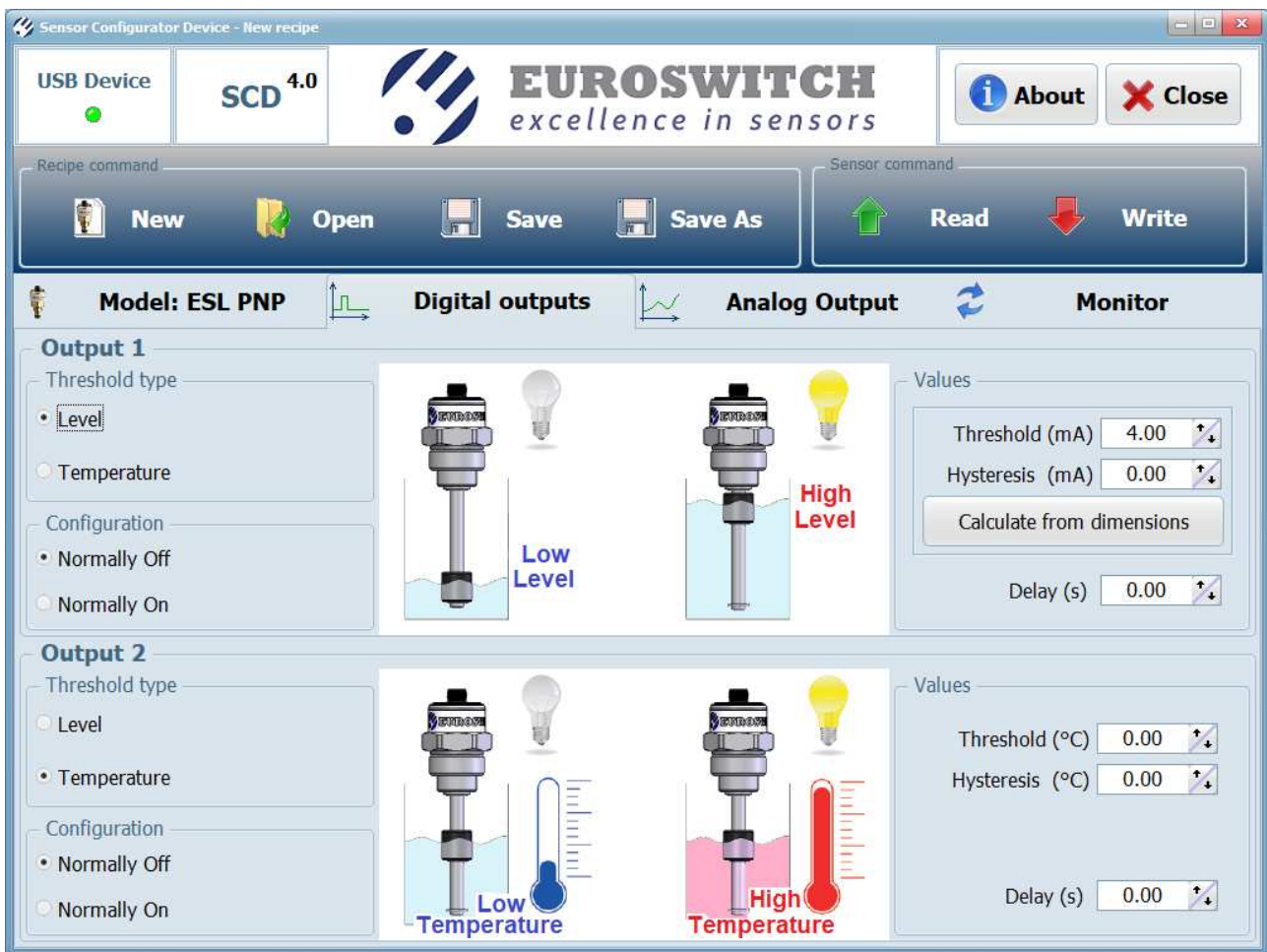


ESL Digital Outputs

This sensor type allows configuring the two digital outputs independently.

The selection of one of the *Threshold type* options modifies the digital output behaviour:

- **Level**: the state of the output is driven by the level of the liquid;
- **Temperature**: the state of the output is driven by measured temperature.



Figures in the central part of the screen update according to the selected threshold type (*Level* or *Temperature*) and the selected configuration (*Normally on* or *Normally off*).

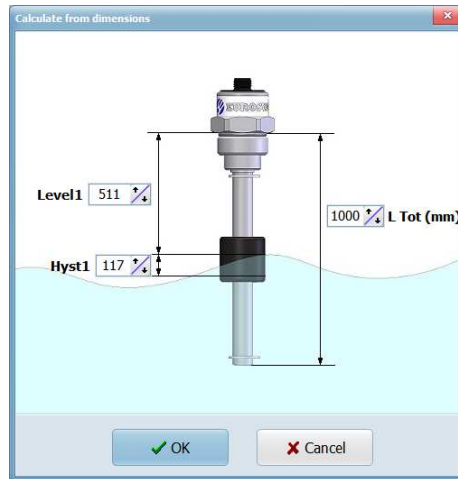
Level output type

For *Level* output type of each digital output (*Output 1* e *Output 2*) the user can set:

- **Configuration:**
 - **Normally off:** the digital output state is OFF if the value of the current of the analog output is below the threshold and ON if the temperature is above the threshold;
 - **Normally on:** the digital output state is ON if the value of the current of the analog output is below the threshold and OFF if the temperature is above the threshold;
- **Threshold (mA):** current threshold of the analog output that is driven by the liquid level;
- **Hysteresis (mA):**
 - If the configuration is set to **Normally Off** the digital output turns OFF when $\text{analog output} < \text{Threshold} - \text{Hysteresis}$.
 - If the configuration is set to **Normally On** the digital output turns ON when $\text{analog output} < \text{Threshold} - \text{Hysteresis}$.
- **Delay (s):** the digital output changes its status if the conditions maintain for a period $> \text{Delay}$.

Look at the explanation graphs in ESL sensor paragraph in order to understand the effect of the parameters on the sensor behaviour.

When the **Level** threshold type of a digital output is selected, the user can press the **Calculate from dimension** button that opens a window useful for the calculation of the current threshold starting from the length of the level sensor.



- **L Tot**: is the total length of the sensor, from the support plane of the flange to the end of the tip;
- **Level 1/2**: is the distance of the liquid level from the support plane of the flange at which the output 1 or 2 should change status;
- **Hyst 1/2**: is the float stroke that corresponds to the hysteresis range.

When the value of **L Tot** is modified, the values of **Level 1/2** and **Hyst 1/2** are modified too in order to keep the same current values of **Threshold** and **Hysteresis**.

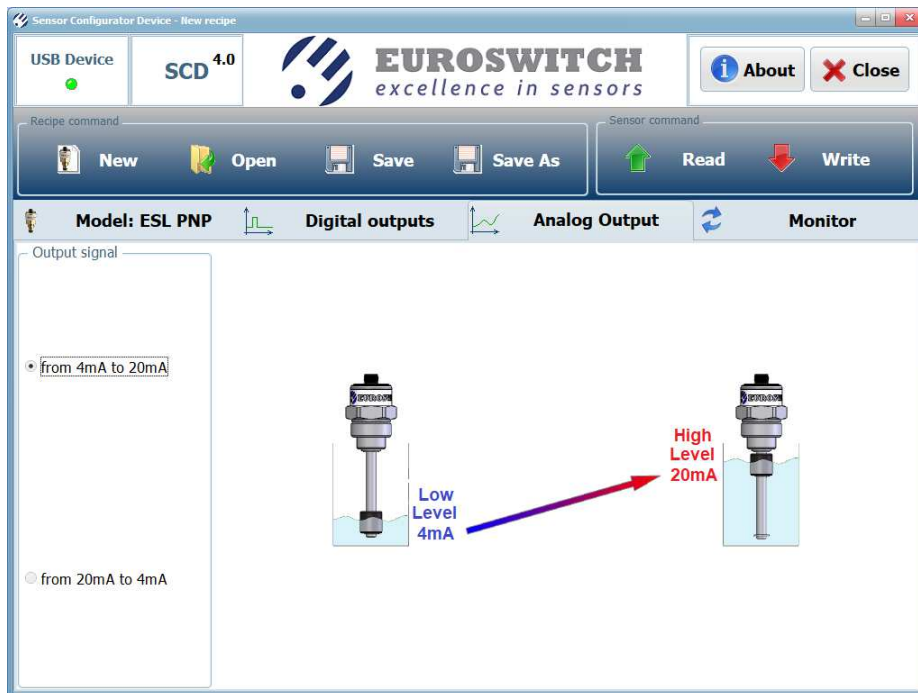
When the values of **Level 1/2** or **Hyst 1/2** are modified and **OK** button is pressed, the values of the **Threshold** and the **Hysteresis** are updated. If button **Cancel** is pressed instead, no modification is applied.

Temperature output type

If **Temperature** output type is selected, the same indications as digital output of EST sensor must be considered.

ESL Analog Output

The current analog output is proportional to the float position. It is possible to choose to have 4 mA output when float is at tip end stop and 20 mA when the float is at the flange end stop or vice versa (for example useful for bottom up mounted sensor).



980 sensors configuration

In *Model* tab select 980 sensor type.



980 Digital Outputs

For each of the two digital outputs *Output 1* and *Output 2* it is possible to set:

- **Configuration:**
 - **Normally off:** the digital output state is OFF if the value of the differential pressure is below the percentage threshold and ON if the differential pressure is above;
 - **Normally on:** the digital output state is ON if the value of the differential pressure is below the percentage threshold and OFF if the differential pressure is above;
- **Threshold (%):** percentage threshold with respect to full scale pressure of the sensor;
- **Delay (s):** the digital output changes its status if the conditions maintain for a period > Delay.

The values of thresholds must satisfy the following constrains:

- **Threshold 1** $\geq 50\%$
- **Threshold 2** $\leq 100\%$
- **Threshold 2 - Threshold 1** $\geq 5\%$

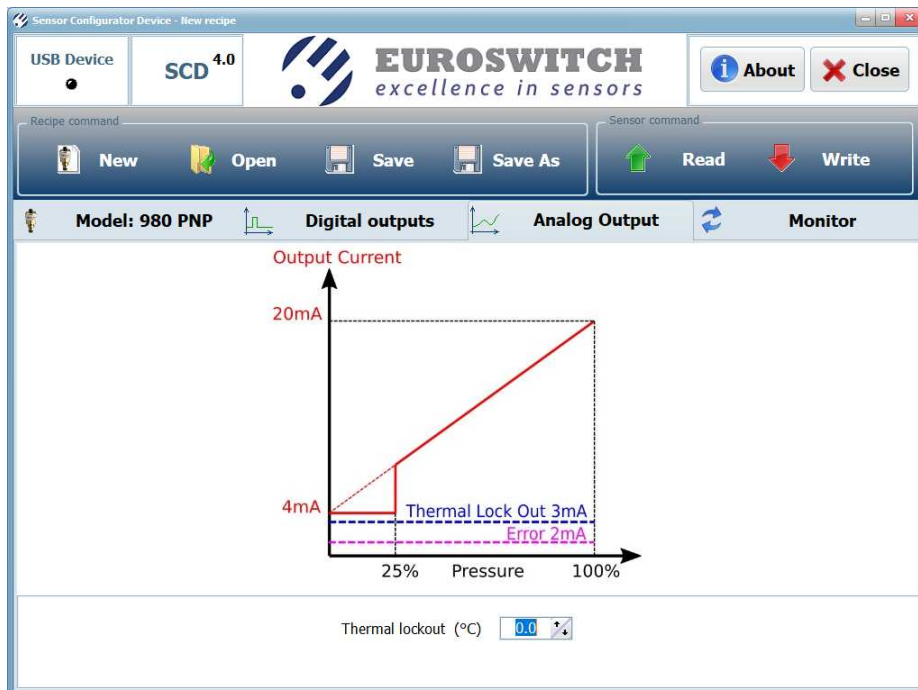
Figures in the central part of the screen update according to the selected configuration (**Normally on** or **Normally off**).

This kind of sensor has its own intrinsic hysteresis that therefore can't be modified.



980 Analog Output

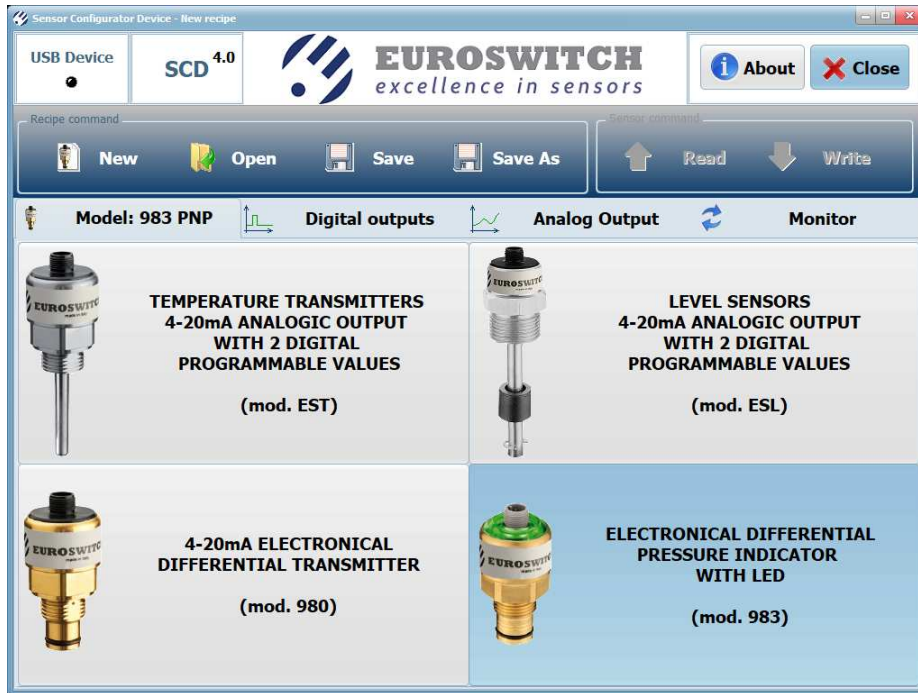
The relation between the differential pressure applied to the sensor and the output current is displayed in the *Analog Output* screen. This relation is fixed.



It is only possible to modify the value of the *Thermal lockout* that is the temperature under which the output current is maintained fixed to 3 mA independently to the applied pressure.

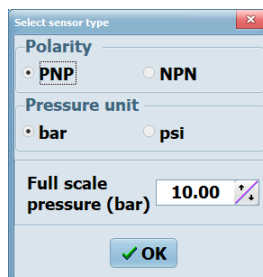
983 sensor configuration

In the *Model* tab select 983 type.



When another tab is selected (*Digital Outputs*, *Analog Output* or *Monitor*) the user is asked to select:

- the type of the digital outputs (*Polarity*) between *PNP* and *NPN*
- the preferred pressure unit between *bar* and *psi*
- the *Full scale pressure* of the sensor.



The type of the digital outputs (*Polarity*) and the *Full scale pressure* can be found on sensor data sheet.

Selecting the wrong output type (*Polarity*) doesn't damage the sensor or the interface board, but makes not possible the communication with the sensor and cause a communication error.

Selecting a wrong Full scale pressure will cause consistency errors during *Read* and *Write* operations.

In order to connect 983 sensors, the M12 male / M12 female adaptation cable must be connected between the sensor and the Dsub 9 / M12 male cable.

983 Digital Outputs

In the same way of 980 sensors, for each of the two digital outputs (**Output 1** e **Output 2**) it is possible to set:

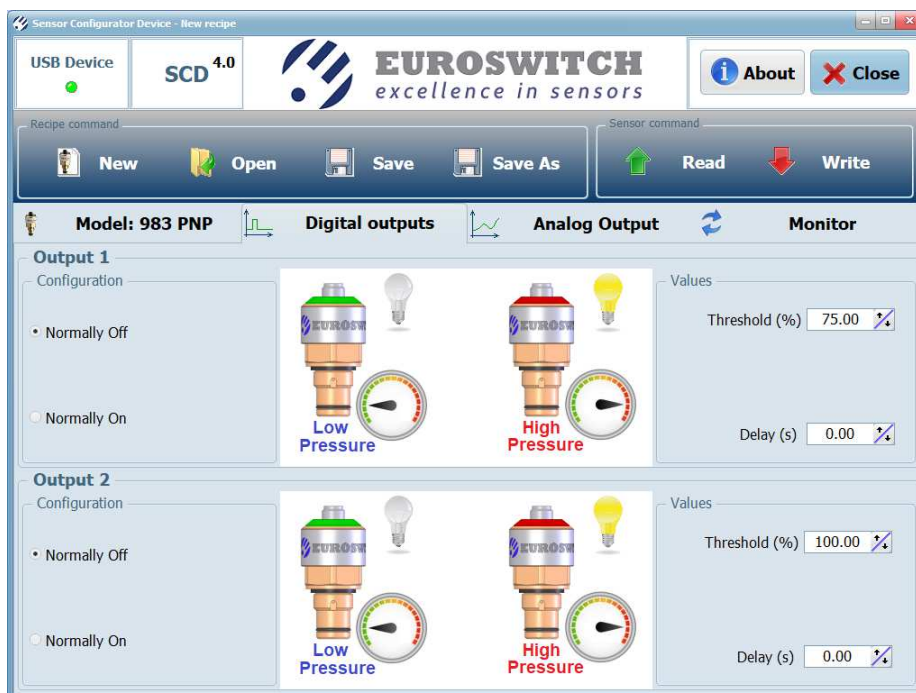
- **Configuration:**
 - **Normally off:** the digital output state is OFF if the value of the differential pressure is below the percentage threshold and ON if the differential pressure is above;
 - **Normally on:** the digital output state is ON if the value of the differential pressure is below the percentage threshold and OFF if the differential pressure is above;
- **Threshold (%):** percentage threshold with respect to full scale pressure of the sensor;
- **Delay (s):** the digital output changes its status if the conditions maintain for a period > Delay.

The values of thresholds must satisfy the following constrains:

- **Threshold 1** >= 50%
- **Threshold 2** <= 100%
- **Threshold 2 - Threshold 1** >= 5%

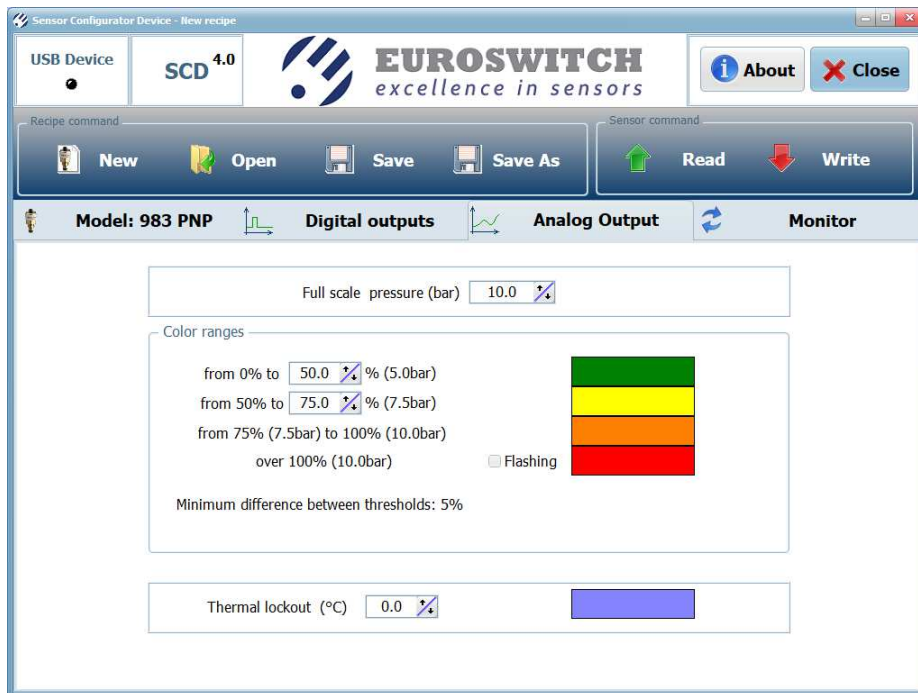
Figures in the central part of the screen update according to the selected configuration (**Normally on** or **Normally off**).

This kind of sensor has its own intrinsic hysteresis that therefore can't be modified.



983 Analog Output

This kind of sensor doesn't have an electrical analog output (4-20 mA) but visualizes the pressure level modifying the colour of the upper part of the sensor near to the connector.



The colours sequence is fixed: Green → Yellow → Orange → steady or flashing Red

It is possible to modify the thresholds (expressed as full scale percentages) that make the colour change from Green to Yellow and from Yellow to Orange. The pressure that makes the colour change from Orange to Red is fixed to Full scale pressure.

The threshold that makes change colour from Green to Yellow can't be lower than 50%.

The difference between two adjacent thresholds can't be smaller than 5%.

Selecting the **Flashing** option the Red colour will be blinking rather than steady.

In the same way as 980 sensors, it is possible to modify the value of the **Thermal lockout**, that is the temperature under which the colour is maintained Blue, independently to the applied pressure.

In case of internal sensor error, the colour of the lighting ring near the connector is White, independently to the applied pressure.