

PRESSURE CONTROLLER



8311



Operating Instructions

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00559848_2206_Ind_F

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- Always respect the safety instructions marked by the symbol opposite as well as those included in the manual.
- Ensure the max. pressure the application can reach is within the chosen pressure range. It is recommended to equip the installation with a pressure relief valve.

Pressure range [bar]	Max. admissible pressure	Destruction pressure
0...2	6	7
0...5	12	15
0...10	25	30
0...20	50	60
0...50	120	150

- The units on the display flash when the max. pressure of the range is exceeded.

1.1 Utilisation

- The 8311 controller has only been designed to measure the relative pressure of a liquid or a gas.
- The following units are available to display the measured pressure: bar, kPa, psi, mPa, Torr, mmHg, atm, MWS, mbar.



When using an absolute pressure unit (Torr, mmHg, atm, MWS), be aware that the air pressure displacement (about 1013 mbar) is not taken into account by the device.

- The measuring element must be solidly screwed onto its support.

There will be no manufacturer warranty for damages caused by unexpected handling or wrong usage of the device. The warranty on the device becomes invalid if any modification or change is made on the device.



The device should only be installed and repaired by specialist staff. The user is not allowed to work on the cables inside the housing. If any difficulties may occur with the device during installation, please contact your nearest Burkert sales office for assistance.

1.2 Precautions at installation and commissioning

- When the device is powered and the cover is open, protection against electric shocks is not effective.
- Always ensure the materials in contact with the medium to measure are chemically compatible.
- To clean the device, only use chemically compatible products.
- Do not insert any object (screwdriver for instance) inside the sensor body. If the body is dirty, use compressed air to clean it.



When dismounting the controller from the pipe, take all the necessary precautions linked to the process.

1.3 Conformity to standards and directives

The applied standards, which verify conformity with the EU directives, can be found on the EU-type examination certificate and/or the EU declaration of conformity (if applicable).

1.4 Conformity to the pressure equipment directive

- Make sure the device materials are compatible with the fluid.
- Make sure the pipe DN and the PN are adapted for the device.

The device conforms to Article 4, Paragraph 1 of the Pressure Equipment Directive 2014/68/EU under the following conditions:

- Device used on a pipe (PS = maximum admissible pressure; DN = nominal diameter of the pipe)

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.c.i	$DN \leq 25$
Fluid group 2, Article 4, Paragraph 1.c.i	$DN \leq 32$ or $PS \times DN \leq 1000$
Fluid group 1, Article 4, Paragraph 1.c.ii	$DN \leq 25$ or $PS \times DN \leq 2000$
Fluid group 2, Article 4, Paragraph 1.c.ii	$DN \leq 200$ or $PS \leq 10$ or $PS \times DN \leq 5000$

- Device used on a vessel (PS = maximum admissible pressure)

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.a.i	$PS \leq 200$ bar
Fluid group 2, Article 4, Paragraph 1.a.i	$PS \leq 1000$ bar
Fluid group 1, Article 4, Paragraph 1.a.ii	$PS \leq 500$ bar
Fluid group 2, Article 4, Paragraph 1.a.ii	$PS \leq 1000$ bar

2.1 Design

The pressure controller 8311 is made up of an electronic module and a measuring element. It may switch a solenoid valve, activate an alarm or establish a control loop.

The switching point can be adjusted by means of the three keys located under the display.

The controller housing can be turned by 180°.

The controller 8311 can be inserted in a fitting before being mounted on any type of pipe.

The electrical connection is carried out via an EN 175301-803 connector and/or a steerable M12 multipin connector.

2.2 Measuring principle

The controller 8311 uses a piezo-resistive ceramic cell.

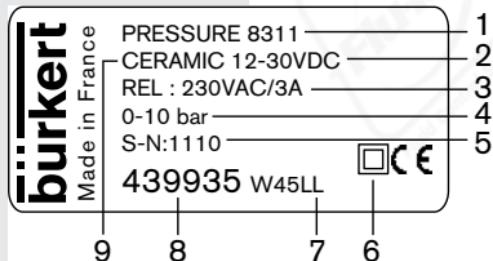
2.3 Available versions

Supply voltage	Output	Electrical connection	Article number		
			G1/2	NPT1/2	Rc1/2
12...30 V DC	NPN and PNP	M12 connector	439932	439940	439936
12...30 V DC	Relay	M12 and EN175301-803 connectors	439935	439943	439939

2.4 Accessories

Accessory	Article number
5-pin M12 cable plug, to be wired	917116
5-pin M12 cable plug, moulded on a shielded cable (2 m)	438680
EN175301-803 cable plug (type 2518) with cable gland	572264
EN175301-803 cable plug (type 2509) with NPT 1/2" reduction	162673

2.5 Description of the label of the controller 8311



1. Measured quantity and type of controller
2. Power supply
3. Output features
4. Pressure range
5. Serial number
6. Protection class: protective insulation
7. Manufacturing code
8. Article number
9. Sensor material

3 TECHNICAL DATA

Pressure controller 8311

General features

Pipe diameter	Any type of pipe with a 1/2" threaded connection piece (G, NPT or Rc)
Medium temperature	-20 °C...+100 °C, +100 °C with a max. ambient temperature of +40 °C
Measuring range	0...10 bar, standard 0...2 bar, 0...5 bar, 0...20 bar and 0...50 bar on request ±1.5 % of the full scale (full scale = max. value of the measuring range)
Accuracy	0.25 %
Repeatability	1 %
- typical	Ceramic cell
- max.	IP65 connectors being plugged-in and tightened
Measuring element	
Protection rating	

Electrical features

Installation class (overvoltage class)	2
Power supply	12...30 V DC
Current consumption	Max. 750 mA + consumption of the load, if the PNP output is connected Max. 50 mA + consumption of the load, if the PNP output is not connected Max. 80 mA, without load
Version with PNP output	
Version with relay output	
Protection against polarity reversal	Yes
Transistor output	NPN and PNP, open collector, 700 mA max., NPN output: 0.2...30 V DC and PNP output: supply voltage (see example in the Annex)
or	
Relay output	250 V AC, max. 3 A or 30 V DC, max. 3 A; programmable

Protection against
short-circuits
Type of cable recommended

Yes for the transistor output
Shielded, wire section: 0.14...0.5 mm²

Electrical connection

NPN/PNP version
Relay version

5-pin M12 cable plug (not supplied)
EN175301-803- (supplied)¹⁾ and 5-pin M12- (not supplied) cable plugs

Materials

Housing
Front plate
Parts in contact
with the medium

Polycarbonate, fiber glass reinforced
Polyester

Stainless steel 316L (DIN 1.4404), FKM in the standard versions (EPDM as an option),
ceramic cell (Al_2O_3)

Environment

Ambient temperature
Relative humidity

0 °C...+60 °C, max. +40 °C if the fluid temperature is near +100 °C
< 80 %, non condensated

4.1 General recommendations



Always check the chemical compatibility of the materials the controller is made of with the products it may be in contact with, for instance: alcohols, strong or concentrated acids, aldehydes, bases, esters, aliphatics, aromatics, ketones, aromatics or halogenated hydrocarbons, oxidizing agents and chlorinated products. For more information, please contact your Burkert sales office.

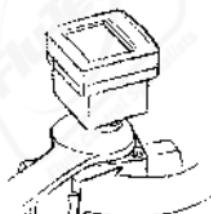
4.2 Mounting on the pipe

The pressure controller 8311 can be inserted in a fitting before being mounted on any type of pipe.

During mounting, follow the instructions given with the fitting.



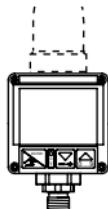
For a G1/2"-version, ensure the gasket is in place



! Do not tighten the controller using the housing; use an appropriate tool.



Do not unscrew the metallic part from the pipe when readjusting the housing.



Always replace the cover in its initial position.

4.3 Electrical connection

Always ensure the power supply is switched off before working on the device. All the cable plugs must be plugged out. Use:

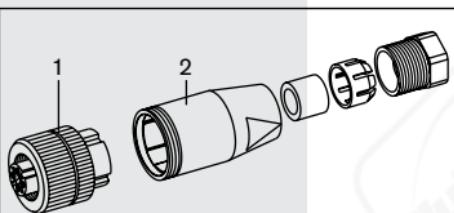
- a shielded cable with an operating temperature $> +80\text{ }^{\circ}\text{C}$.
- a high quality voltage supply (filtered and regulated).



Install the following security devices:

- for the power supply: 1 A-fuse
- for the relay: a max. 3 A-fuse and a circuit breaker (depending on the application).

4.3.1 Cable plugs

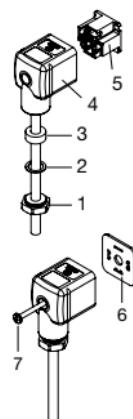


Multipin M12 cable plug (not supplied)

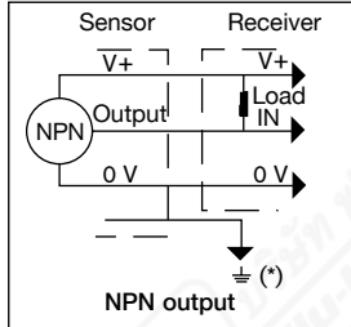
- Loosen threaded ring [1]
- Remove part [2] from the connector
- Wire acc. to pin assignment (see 4.3.2 or 4.3.3).

2518 cable plug (supplied)

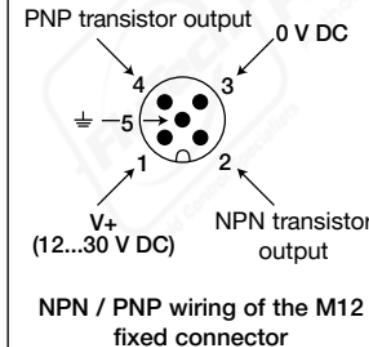
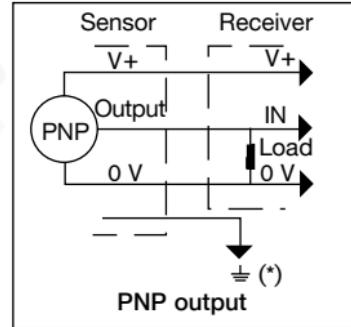
- Unscrew the pressure screw [1] and remove the pressure ring [2] and the seal [3].
- Remove contact holder [5] from the cover [4].
- Insert the cable into pressure screw [1], through the pressure ring [2], through the seal [3] and finally through the cover [4].
- Connect the wires on the contact holder [5].
- Position the contact holder [5] in steps of 90° then put it back into cover [4], pulling gently on the cable so that the wires do not clutter the housing.
- Tighten the pressure screw [1] (1.5...2 Nm).
- Place the seal [6] between the connector and the fixed connector on the device and then plug the type 2518 connector into the fixed connector.
- Insert and tighten the central screw [7] (0.5...0.6 Nm) to ensure tightness and correct electrical contact.



4.3.2 Version with transistor output (NPN / PNP)



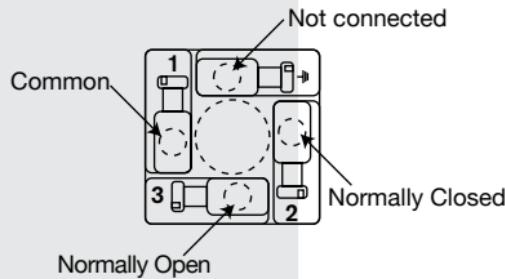
(*) Functional earth



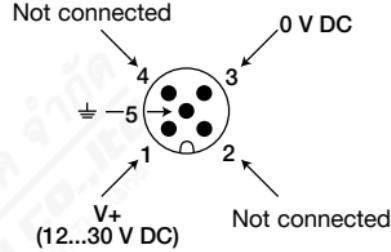
Pin number of the M12 cable available as an accessory (article nr. 438680)	Wire colour
1	brown
2	white
3	blue
4	black
5	green/yellow or grey

The controller is fitted with a steerable M12 fixed connector:
Unfasten counternut. Turn the fixed connector to the right position, but by max. 360° to avoid twisting of the cables inside the housing. Fasten counternut using the appropriate tool while maintaining the fixed connector in the right position.

4.3.3 Version with relay output



Wiring of the EN 175301-803 fixed connector, relay output



Wiring of the M12 fixed connector (12...30 V DC power supply)

The controller is fitted with a steerable M12 fixed connector:
Unfasten counternut. Turn the fixed connector to the right position, but by max. 360° to avoid twisting of the cables inside the housing. Fasten counternut using the appropriate tool while maintaining the fixed connector in the right position.



Operating safety

When the voltage at the relay terminals is higher than 24 V and the cable plugs are not correctly plugged-in and tightened, there is a risk to electrocute yourself.

Always check all the cable plugs before powering the device to ensure the good operating of the device.

5.1 General recommendations



Keep in mind that the process may be influenced by all the parameter settings you make. Fill-in the table on page 22 with your settings of the controller.

5.2 Functionalities

The device has three operating modes:

Normal mode

Display of the measured pressure and the switching thresholds programmed. From the Normal mode, you can access the Calibration and Simulation modes.

Calibration mode

Access to the programming of all the parameters (unit, zero adjustment, K-factor, calibration through the „Teach-in“ feature, output, filter, bargraph). From the Calibration mode, you can go back to the Normal Mode.

Simulation mode

Entering a theoretical pressure value to test the configuration programmed in the Calibration mode. From the Simulation Mode, you can go back to the Normal mode.

5.3 Programming keys

To display the measured value and the configuration (8 characters:
4 numeric and 4 alphanumeric charact.)



To modify the digital value (0...9);
To go back to the previous function.

To indicate the status of the switching output (red LED)

To validate a function;
To validate the entered data.

To select the character;
To go to the next function.

5.4 Default configuration

At the first powering up, the configuration of the controller 8311 is as follows:

Pressure unit:	bar
Output:	Hysteresis
OLO:	0.2 bar
OHI:	1 bar
DEL:	0 s
Filtre:	2
BGLO:	0 bar
BGHI:	Max. value of the measuring range
Extension board:	No

5.5 Normal mode

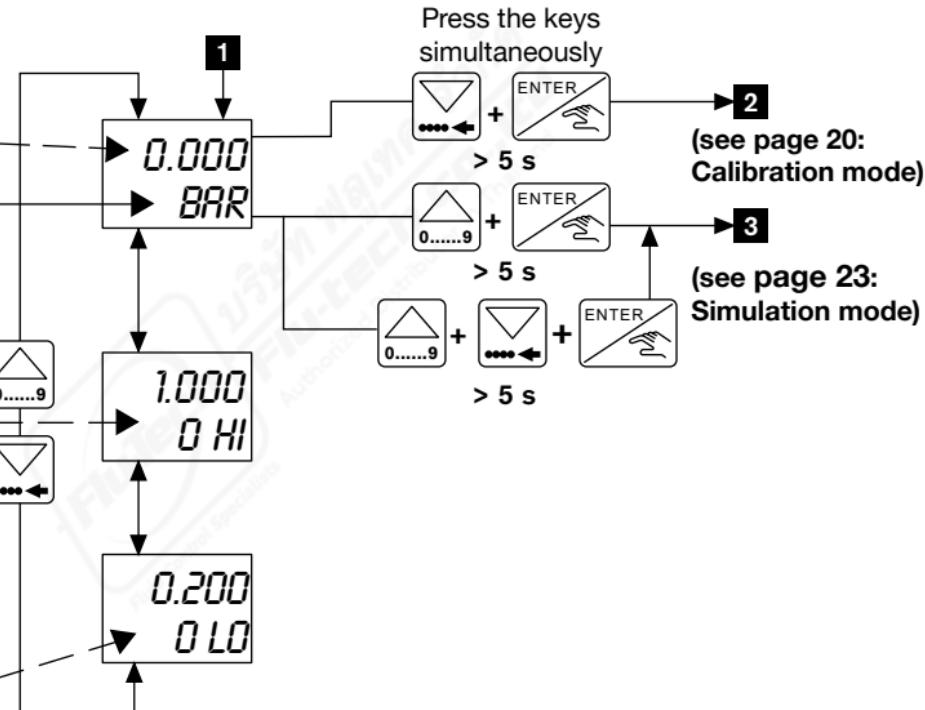
Display of the measured pressure.
N.B.: When the units flash, the max. value of the pressure range has been exceeded.

To go back to the previous function.

To display the high threshold value (O HI).

To go to the next function.

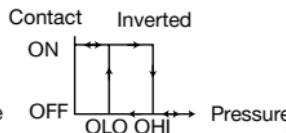
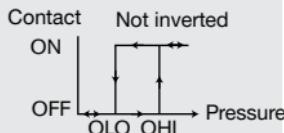
To display the low threshold value (O LO).



5.6 Possible switching modes of the 8311

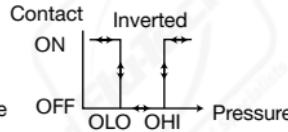
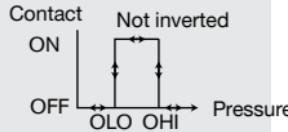
Hysteresis mode

The change of state occurs when a threshold is detected (increasing pressure: high threshold (OHI) to be detected, decreasing pressure: low threshold (OLO) to be detected).

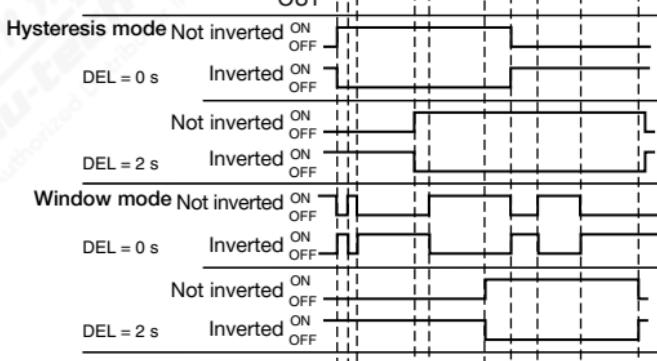
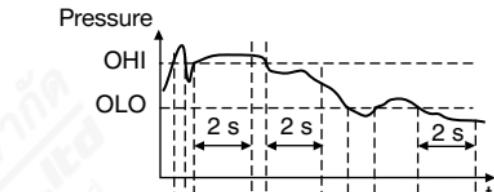


Window mode

The change of state occurs when any threshold is detected.



The delay (DEL) is set for the both switching thresholds. The switching only occurs when either threshold value (OHI - OLO) is exceeded for a duration higher than the DEL delay.



Switching examples of the 8311 depending on the pressure and the switching mode chosen

5 PROGRAMMING

Pressure controller 8311

5.7 Calibration mode

To change the pressure unit (bar, kPa, psi, mPa, Torr, mmHg, atm, MWS, mbar).

To go back to the previous function.

To go to the next function.

To adjust the controller zero point, at nil pressure.

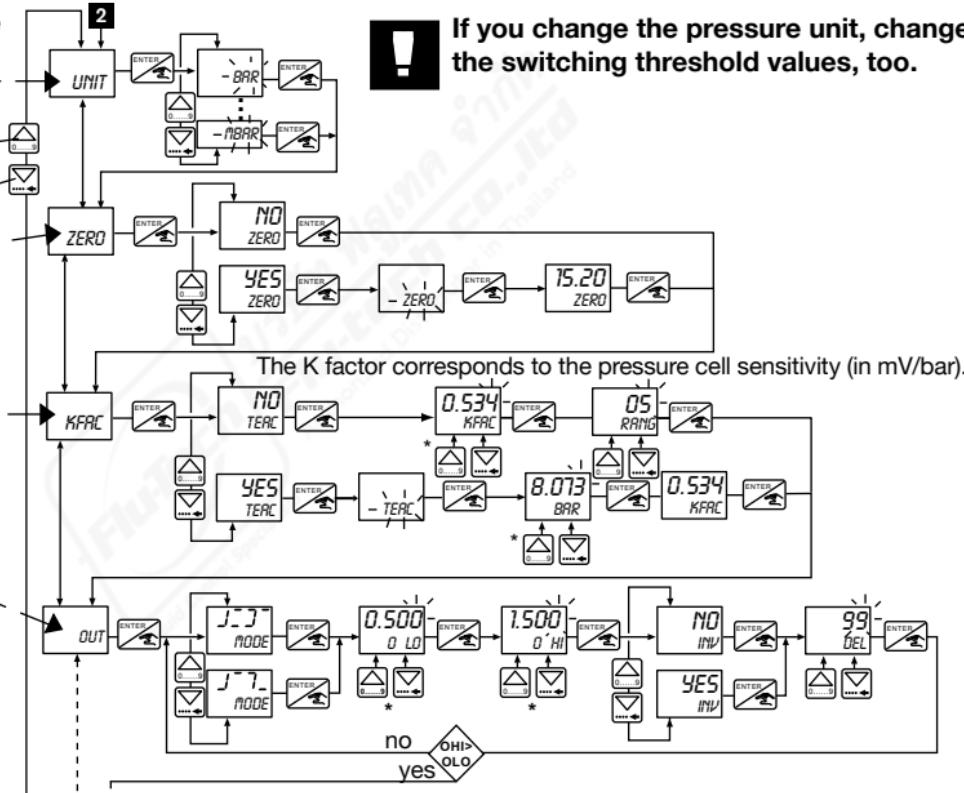
To enter the K-factor or have it calculated through the Teach-in feature. The K factor value is indicated on the test certificate.

To enter the full scale value of the measuring range (RANG).

To choose:

- the switching mode of the output (Hysteresis or Window, see page 19)
- the low (O LO) and high (O HI) switching thresholds
- whether the switching mode is inverted or not (INV, see page 19)
- the delay before switching (DEL, in seconds)

! If you change the pressure unit, change the switching threshold values, too.

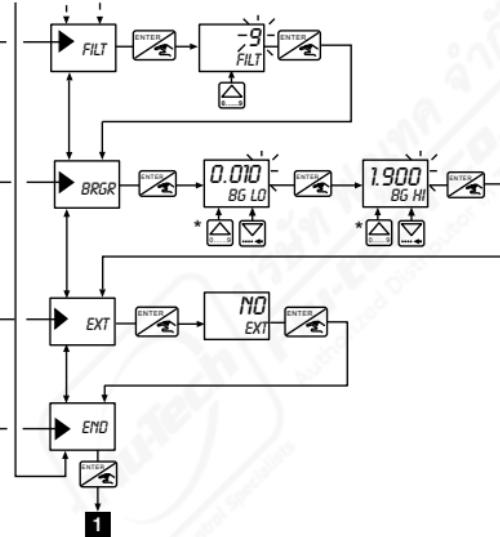


To choose the filtering level (FILT) of the pressure displayed, only; «0» means «all the pressure variations are displayed», «9» smoothes the displayed pressure changes at the most.

To define the min. (BG LO) and max. (BG HI) values of the bargraph at the bottom of the display.

Not used. — — —

To return (END) to the display of the pressure in the Normal mode.



* To move the decimal point, press simultaneously keys



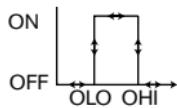
Configuration of the 8311:

Fill in the table with the values programmed in the Calibration mode.

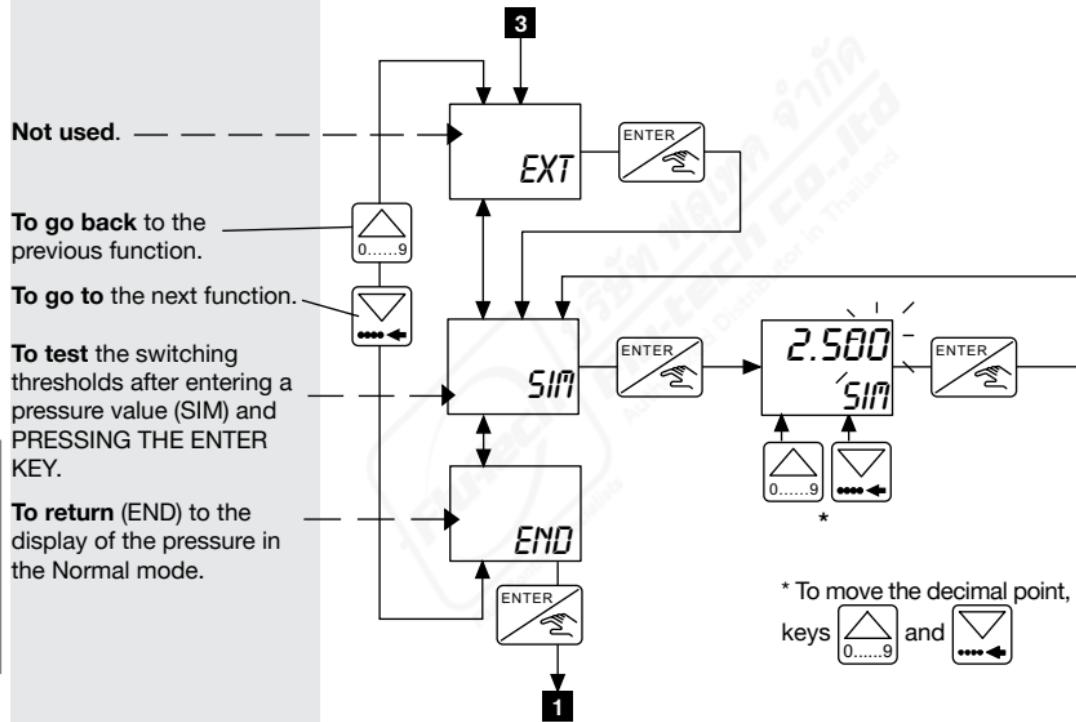
1) Hysteresis mode:



2) Window mode:



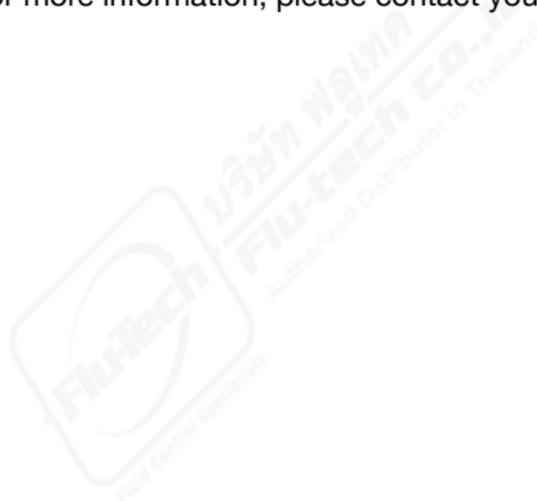
5.8 Simulation mode



6.1 Cleaning

The controller 8311 can be cleaned with water or any solution compatible with the materials the device is made of.

For more information, please contact your Burkert sales office.

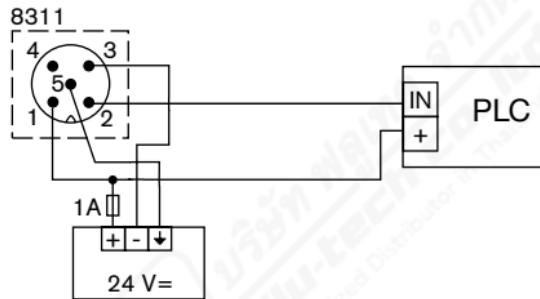


6.2 Error messages

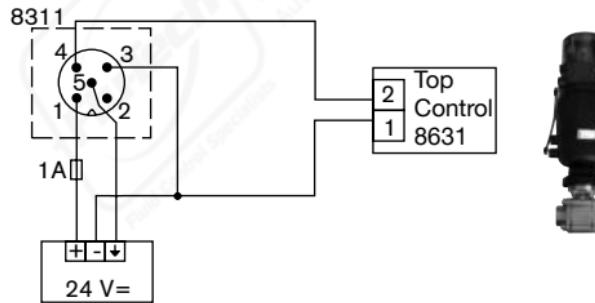
Type of message	Description	To do
ERR 0	Calibration data is lost. Reading error: the process is stopped.	Press the ENTER key to go back to the Normal mode. The device has returned to its default configuration: the device must be calibrated again. If the message appears frequently, send the device back to your Burkert sales office.
ERR 1	Calibration data cannot be saved. Write error: the process is stopped.	Press the ENTER key to go back to the Normal mode. The device displays the configured data; BUT this data has not been saved: the device must be calibrated again. If the message appears frequently, send the device back to your Burkert sales office.
ERR 2	The calibration parameters cannot be accessed. Menu reading error: the process goes on operating.	Press the UP and DOWN keys under the display to scroll through the menus. If the message appears frequently, send the device back to your Burkert sales office.
ERR 4	The 8311 controller no more measures the pressure correctly: the process is stopped.	Perform a new Teach-In procedure (automatic calculation of the K-factor). If the message appears frequently, send the device back to your Burkert sales office.

**NPN connection:
controller 8311
(NPN/PNP version)
to a PLC.**

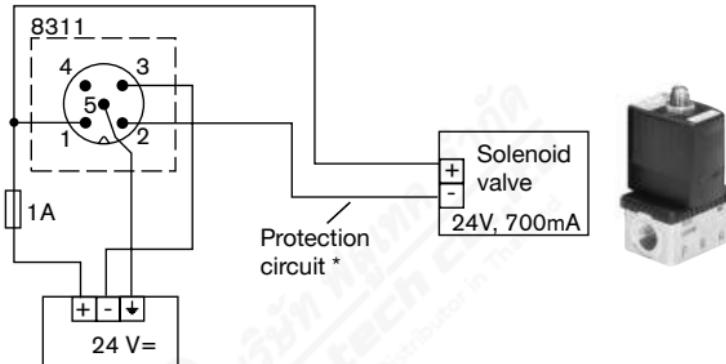
7.1 Examples of connections with the 8311



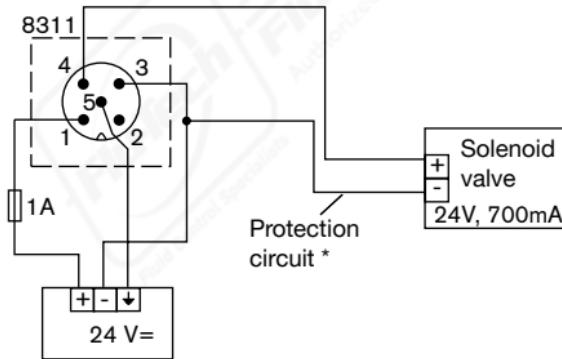
**PNP connection:
controller 8311
(NPN/PNP version)
to a Top Control
8631.**



**NPN connection:
controller 8311
(NPN/PNP version)
to a solenoid valve
6014.**

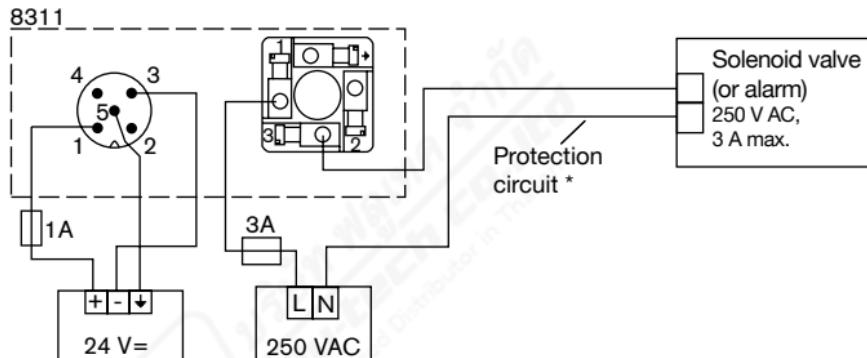


**PNP connection:
controller 8311
(NPN/PNP version)
to a solenoid valve.**

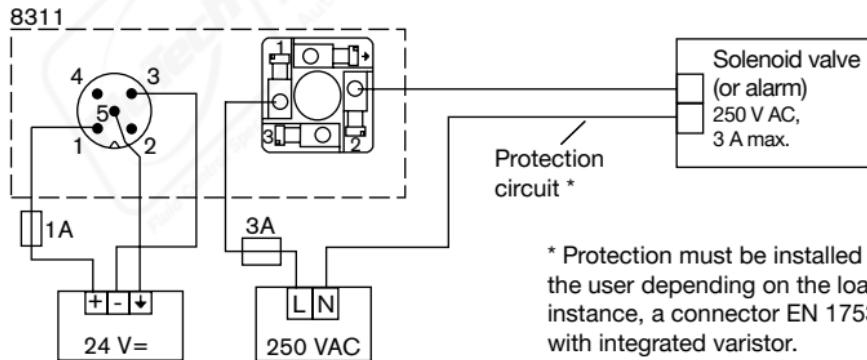


* Protection must be installed by the user depending on the load, for instance, a connector EN 175301-803 with integrated varistor.

NO, Normally Open, connection: controller 8311 (relay version) to a solenoid valve.



NC, Normally Closed, connection: controller 8311 (relay version) to a solenoid valve.



* Protection must be installed by the user depending on the load, for instance, a connector EN 175301-803 with integrated varistor.