

Translation of the Original Operating Manual, Part 1/2
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Pressure Switch

EDS 10



READ THOROUGHLY BEFORE USING THE DEVICE

KEEP FOR FUTURE REFERENCE

ID: 900.100.0844 | Version: 11.2019.0

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1. General and Safety-Related Information on This Operating Manual

This operating manual enables safe and proper handling of the product, and forms part of the device. It should be kept in close proximity to the place of use, accessible for staff members at any time.

All persons entrusted with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the device must have read and understood the operating manual and in particular the safety-related information.

The following documents are an important part of the operating manual:

- Data sheet
- Supplementary sheet, page 2/2 Operation (900.100.0840)

For specific data on the individual pressure switches, please refer to the respective data sheet.

Download these by accessing www.afriso.de or request them by e-mail or phone: info@afriso.com | Fon: +49 7135 102-211

In addition, the applicable accident prevention regulations, safety requirements, and country-specific installation standards as well as the accepted engineering standards must be observed.

1.1 Symbols Used

	- Type and source of danger - Measures to avoid the danger
Warning word	
	- Imminent danger! - Non-compliance will result in death or serious injury.
DANGER	
	- Possible danger! - Non-compliance may result in death or serious injury.
WARNING	
	- Hazardous situation! - Non-compliance may result in minor or moderate injury.
CAUTION	

NOTE – draws attention to a possibly hazardous situation that may result in property damage in case of non-compliance.

- ✓ Precondition of an action

1.2 Staff Qualification

Qualified persons are persons that are familiar with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the product and have the appropriate qualification for their activity.

This includes persons that meet at least one of the following three requirements:

- They know the safety concepts of metrology and automation technology and are familiar therewith as project staff.
- They are operating staff of the measuring and automation systems and have been instructed in the handling of the systems. They are familiar with the operation of the devices and technologies described in this documentation.
- They are commissioning specialists or are employed in the service department, and have completed training that qualifies them for the repair of the system. In addition, they are authorized to put into operation, to ground, and to mark circuits and devices according to the safety engineering standards.

All work with this product must be carried out by qualified persons!

1.3 Intended Use

The devices are used to convert the physical parameter of pressure into an electric signal.

The **pressure switch** is suited to display the system pressure being applied.

The user must check whether the device is suited for the selected use. In case of doubt, please contact our sales department (info@afriso.com | Fon: +49 7135 102-211). AFRISO assumes no liability for any wrong selection and the consequences thereof!

The fluids that can be measured are gases and liquids that are compatible with the sealing material and with stainless steel 316L (1.4404 and 1.4435).

1.4 Limitation of Liability and Warranty

Failure to observe the instructions or technical regulations, improper use and use not as intended, and alteration of or damage to the device will result in the forfeiture of warranty and liability claims.

1.5 Safe Handling

NOTE – Treat the device with care both in the packed and unpacked condition!

NOTE –The device must not be altered or modified in any way.

NOTE –Do not throw or drop the device!

NOTE – The display and the plastic housing are equipped with a turning limiter. Do not attempt to overturn the display or housing by exerting increased force.

The device is state-of-the-art and is operationally reliable. Residual hazards may originate from the device if it is used or operated improperly.

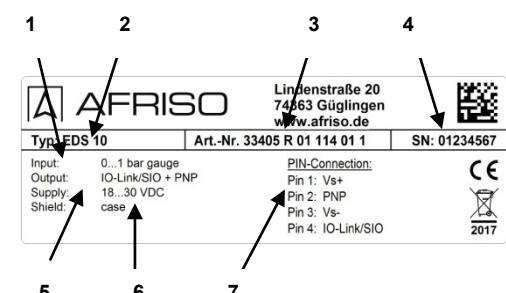
1.6 Scope of Delivery

Check that all parts listed in the scope of delivery are included free of damage, and have been delivered according to your purchase order:

- EDS 10 pressure switch
- for mech. connections to DIN 3852: O-ring (premounted)
- this operating manual, supplementary sheet – Operation

2. Product Identification

The device can be identified by means of the type plate with order code. The most important data can be gathered therefrom.



- 1 Measuring range
- 2 Type
- 3 Order code
- 4 Serial number
- 5 Signal
- 6 Supply
- 7 Terminal assignment

Fig. 1: Type plate

3. Mounting

3.1 Mounting and Safety Instructions

	- Airborne parts, leaking fluid, electric shock - Always mount the device in a depressurized and de-energized condition!
DANGER	

NOTE –When installing the device, do not use any force in order to prevent damage to the device or the system.

NOTES – for mounting outdoors or in a moist environment:

- Connect the device electrically straightaway after mounting or prevent moisture penetration, e.g. by a suitable protective cap. (The protection rating specified on the data sheet applies to the connected device.)
- Select the mounting position such that splashed and condensed water can drain off. Stationary liquid on sealing surfaces must be excluded!
- If the device has a cable outlet, the outgoing cable must be routed downwards. If the cable needs to be routed upwards, this must be done in an initially downward curve.
- Mount the device such that it is protected from direct solar radiation. In the most unfavorable case, direct solar radiation leads to the exceeding of the permissible operating temperature. This must be excluded if the device is used in any explosion-hazardous area!

NOTE–When installing the device, avoid high mechanical stresses on the pressure port! This will result in a shift of the characteristic curve or to damage, in particular in case of very small pressure ranges and devices with a pressure connection/port made of plastic.

NOTE –In hydraulic systems, arrange the device such that the pressure port points upwards. (venting)

NOTE– If the device is installed with the pressure port pointing upwards, ensure that no liquid drains off on the device. This could result in humidity and dirt blocking the gauge reference in the housing, and could lead to malfunctions. If necessary, dust and dirt must be removed from the edge of the screwed joint of the electrical connection.

NOTE – Do not remove the packaging or protective caps of the device until shortly before the mounting procedure in order to exclude any damage to the diaphragm and the threads!

Protective caps must be kept! Dispose of the packaging properly!

NOTE – The specified tightening torques must not be exceeded!

3.2 Mounting Steps for Connections According to DIN 3852

NOTE –Do not use any additional sealing material such as tow, hemp or Teflon tape!

- ✓ The O-ring is undamaged and seated in the designated groove.
 - ✓ The sealing face of the mating component has a flawless surface. (Rz6.3)
- 1 Screw the device into the mating thread by hand.
 - 2 Devices with a wrench flat must be tightened using a suitable open-end wrench.
Wrench flat made of steel:
G1/4": approx. 5 Nm; G1/2": approx. 10 Nm;

3.3 Mounting Steps for Connections According to EN 837

- ✓ A suitable seal for the measured fluid and the pressure to be measured is available. (e.g. a copper seal)
 - ✓ The sealing face of the mating component has a flawless surface. (Rz 6.3)
- 1 Screw the device into the mating thread by hand.
 - 2 Then tighten the connection using an open-end wrench:
G1/4": approx. 20 Nm; G1/2": approx. 50 Nm

3.4 Mounting Steps for NPT Connections

- ✓ Suitable fluid-compatible sealing material, e.g. PTFE tape, is available.
- 1 Screw the device into the mating thread by hand
 - 2 Then tighten the connection using an open-end wrench:
1/4" NPT: approx. 30 Nm; 1/2" NPT: approx. 70 Nm

3.5 Orientation of the Display Module

The display may be turned to the desired position in order to enable perfect readability even in case of unusual installation positions. The turning capability is shown below. (pay attention to the turning limiter)

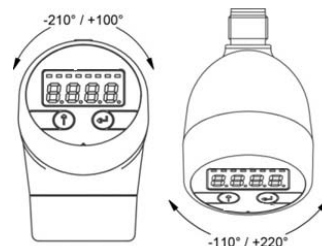


Fig. 2: Display module

4. Electrical Connection

4.1 Connection and Safety Instructions

	- Improper installation may result in electric shock - Always mount the device in a depressurized and de-energized condition!
WARNING	

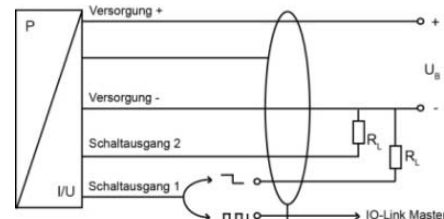
NOTE –Use a shielded and twisted multicore cable for the electrical connection.

4.2 Electrical Connections

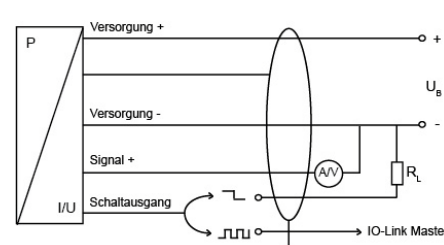
Electrical connections	M12x1 (4-pin) metal (without analog output)	M12x1 (4-pin) metal (with analog output)
Supply +	1	1
Supply –	3	3
Signal +	-	2
Communication/ Contact 1	4	4
Contact 2	2	-
Shield	Pressure connection	Pressure connection

Connection circuit diagrams:

3-wire system (SIO with contact)



3-wire system (SIO with analog output)



5. Commissioning

- ✓ The device has been installed properly
- ✓ The device does not have any visible defect

6 Operation

6.1 Control and Display Elements

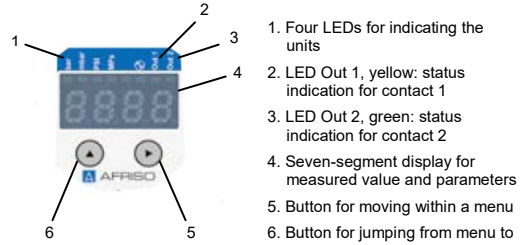


Fig. 3: Control panel for device with 2 contacts

LED status in normal mode		
Yellow LED	on	Switching point 1 reached, contact active
	off	Switching point not reached
Green LED	on	Switching point 2 reached, contact active
	off	Switching point not reached

Button operation		
▲	Short actuation	to jump from menu 1 to menu 5, then back to the display mode
	Pressing and holding	for fast incrementing of parameter values
▶		to select the menu item within a menu
		to adopt the adjusted parameter and return to the current menu item
▲▶	Pressing both buttons simultaneously	to return to the display mode

The device is configured according to VDMA 24574-1.

6.2 Switching & Switch-Back Behavior

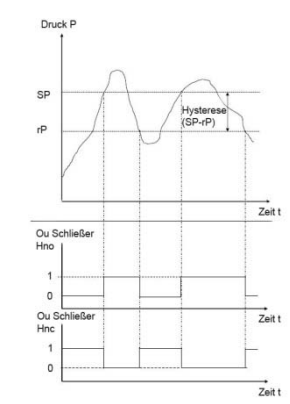


Fig. 4: Switching & switch-back behavior for hysteresis function in the pressure-time diagram

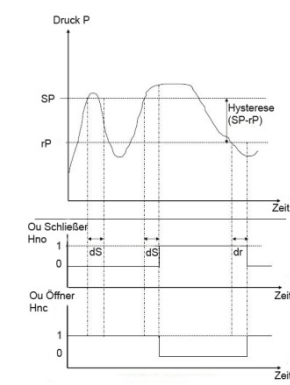


Fig. 5: Switching & switch-back delay for hysteresis function in the pressure-time diagram

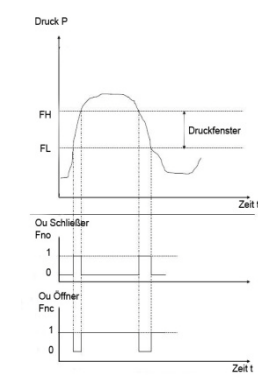


Fig. 6: Switching & switch-back behavior for window function in the pressure-time diagram

6.3 Menu System Structure

See supplementary sheet, page 2/2 Operation (900.100.0840)

6.4 Menu List

First menu level	
SP 1 FH 1	Menu 1 – Setting of switching point 1 Setting of the respective value for the activation of the switching point 1. If the window function is activated in the menu 5:6 the value of the switching point 1 will be the upper pressure limit of the window (FensterHigh / WindowHigh).
rP 1 FL 1	Menu 2 – Setting of switch-back point 1 Setting of the respective value for the activation of the switch-back point 1. If the window function is activated in the menu 5:6 the switch-back value of the switching point 1 will be the lower pressure limit of the window (FensterLow / WindowLow).
SP 2 FH 2	Menu 3* – Setting of switching point 2 Setting of the respective value for the activation of the switching point 2. If the window function is activated in the menu 5:7 the value of the switching point 2 will be the upper pressure limit of the window.
rP 2 FL 2	Menu 4* – Setting of switch-back point 2 Setting of the respective value for the activation of the switch-back point 2. If the window function is activated in the menu 5:7 the switch-back value of the switching point 2 will be the lower pressure limit of the window.
EF	Menu 5 – Enhanced Functions
Second menu level	
rES	Menu 5:1 – Reset Restoring of all adjustable parameters to the status/value at delivery and deletion of the minimum and maximum values
dS 1	Menu 5:2 – Switching delay time 1 Setting of the value for the switching delay time 1 after reaching the switching point 1 (adjustable from 0 to 50 s)
dr 1	Menu 5:3 – Switch-back delay time 1 Setting of the value for the switch-back delay time 1 after reaching the switch-back point 1 (adjustable from 0 to 50 s)
dS 2	Menu 5:4* – Switching delay time 2 Setting of the value for the switching delay time 2 after reaching the switching point 2 (adjustable from 0 to 50 s)
dr 2	Menu 5:5* – Switch-back delay time 2 Setting of the value for the switch-back delay time 2 after reaching the switch-back point 2 (adjustable from 0 to 50 s)
ou 1	Menu 5:6 – Output 1 Switching function of the contact: Hno = Hysteresis function, normally open contact Hnc = Hysteresis function, normally closed contact Fno = window function, normally open contact Fnc = window function, normally closed contact
ou 2	Menu 5:7* – Output 2 Switching function of the contact: Hno = Hysteresis function, normally open contact Hnc = Hysteresis function, normally closed contact Fno = window function, normally open contact Fnc = window function, normally closed contact
uni	Menu 5:8 – Unit shifting Selection of the physical measuring unit for the displayed and set pressure values: bAr = bar, mBa = mbar, PSI = PSI, mPA = MPa
lo	Menu 5:9 – Minimum value Indication of the minimum pressure applied during the measurement (the value will be lost if the voltage supply is interrupted)
Hi	Menu 5:10 – Maximum value Indication of the maximum pressure applied during the measurement (the value will be lost if the voltage supply is interrupted)
---	Menu 5:11 – Deletion of minimum/maximum values The execution of the value deletion process must be acknowledged on the display
SET0	Menu 5:12 – Zero-point adjustment Correction of the zero point of the display and of the analog output signal by up to +/- 3% of the nominal pressure range
dAP	Menu 5:13 – Damping of measured values Setting of the value for the damping of measured values (adjustable in steps of 10 ms from 0 to 1000 ms)
codE	Menu 5:14 – Access protection Setting of the password for the access protection of the menu 0000 = no password Adjustable from 0000 to 9999

* Menu marked with an asterisk do not exist in pressure switches with analog output

Menu item	Designation	Factory setting	Own setting
Menu 1 SP1/FH1	Switching point 1 / WindowHigh 1	80% of nominal pressure	
Menu 2 rP1/FL1	Switch-back point 1 / WindowLow 1	75% of nominal pressure	
Menu 3 SP2/FH2	Switching point 2 / WindowHigh 2	80% of nominal pressure	
Menu 4 rP2/FL2	Switch-back point 2 / WindowLow 2	75% of nominal pressure	
Menu 5:2 dS1	Switching delay time 1	0 sec	
Menu 5:3 dr1	Switch-back delay time 1	0 sec	
Menu 5:4 dS2	Switching delay time 1	0 sec	
Menu 5:5 dr2	Switch-back delay time 1	0 sec	
Menu 5:6 ou1	Switching function of switch output 1	Hno	
Menu 5:7 ou2	Switching function of switch output 2	Hno	
Menu 5:8 uni	Units	bar	
Menu 5:13 dAP	Damping of measured values	0 ms	
Menu 5:14 code	Password	0000	

7. IO-Link Interface

7.1 General Device Information

Baud rate	COM 2 (38.4 kBaud)
Process data length, input	2 bytes
Minimum cycle time	5 ms
IO-Link version	V 1.1
SIO mode	Yes

7.2 SIO Mode (Standard IO Mode)

In this mode, the pressure switch works like a normal pressure transmitter with standard output signals. The digital output is always at pin 4 (output 1) of the M12 connector. Depending on the design, pin 2 (output 2) can be an analog output or an additional digital output.

7.3 IO-Link Mode (Communication Mode)

The pressure switch will switch over to the IO-Link communication mode if it works under an IO-Link Master. The IO-Link communication is only possible via pin 4 of the M12 connector.

7.4 Process Data

The process data length of the pressure switch is 16 bits. The switching statuses (BCD1 and BCD2) as well as the current measured values are transmitted. The 14 bits of the measured value are scaled according to the measuring range of the pressure switch.

15 th bit	14...2	1	0
Signed bit	Measured value	BDC2 / output 2	BDC1 / output 1

7.5 Error Codes

Error Code	Description
0x8011	Index not available
0x8012	Subindex not available
0x8023	Access denied
0x8030	Parameter value out of range
0x8033	Parameter length overrun
0x8034	Parameter length underrun

7.6 Event Codes

	Event Codes IO-Link 1.1	Event-Codes IO-Link 1.0	Device Status	Type
No malfunction	0x0000	0x0000	0	Notification
General malfunction. Unknown error	0x1000	0x1000	4	Error
Process variable range over-run. Process data uncertain	0x8C10	0x8C10	2	Warning
Process variable range under-run. Process data uncertain	0x8C30	0x8C10	2	Warning



7.7 Parameter Data

The parameter data of the pressure switches correspond to the Smart Sensor Profile.

Index hex	Subindex hex	Object name	Single Value	Default	Comment
0x02	0x00	System Commands	0x81 = delete min/max value 0x82 = res 0xA0 = Set0		The action is executed by writing into the subindex
0x03	0x00	Data Storage Index	0x01: Upload Start 0x02: Upload End 0x03: Download Start 0x04: Download End 0x05: Datastorage Break		
0x0C	0x00	Device Access Lock	0x00: Unlocked 0x01: IO-Link Lock 0x02: Datastorage Lock 0x04: Parameterization Lock 0x08: User Interface Lock 0x03: IO-Link Lock + Datastorage Lock 0x05: IO-Link Lock + Parameterization Lock 0x09: IO-Link Lock + User Interface Lock 0x06: Datastorage Lock + Parameterization Lock 0x0A: Datastorage Lock + User Interface Lock 0x07: Datastorage Lock + IO-Link Lock + Parameterization Lock 0x0B: Datastorage Lock + IO-Link Lock + User Interface Lock	0x00: Unlocked	
0x24	0x00	Device Status	0x00 Device is operating properly 0x02 Out-of-specification 0x04 Failure		
0x3D	0x02	SwitchPoint mode 1	0x80: Hysteresis NO 0x81: Hysteresis NC 0x82: Window NO 0x83: Window NC	0x80: HNo	
0x3F	0x02	SwitchPoint mode 2	0x80: Hysteresis NO 0x81: Hysteresis NC 0x82: Window NO 0x83: Window NC	0x80: HNo	
0xD4	0x00	Unit	0x00 bar 0x01 mbar 0x02 PSI 0x03 MPa	0x00: bar	Pressure unit of the display is changed; the IO-Link process data are not changed

Index hex	Subindex hex	Object name	Access	Length	Value Range	Gradient	Unit	Default
0x3C	0x01	SetPoint 1 = SP1	R/W	2 Byte	Process Data			100%
0x3C	0x02	SetPoint 2 = rP1	R/W	2 Byte	Process Data			0%
0x3E	0x01	SetPoint 1 = SP2	R/W	2 Byte	Process Data			100%
0x3E	0x02	SetPoint 2 = rP2	R/W	2 Byte	Process Data			0%
0x60	0x00	Password	W	4 Byte	0000.9999			0
0xD0	0x00	Switching Delay Time 1	R/W	2 Byte	0 500	0.1	sec	0
0xD1	0x00	Switch-Back Delay Time 1	R/W	2 Byte	0 500	0.1	sec	0
0xD2	0x00	Switching Delay Time 2	R/W	2 Byte	0 500	0.1	sec	0
0xD3	0x00	Switch-Back Delay Time 2	R/W	2 Byte	0 500	0.1	sec	0
0xD5	0x00	Min Pressure Value	R	2 Byte	Process Data			
0xD6	0x00	Max Pressure Value	R	2 Byte	Process Data			
0xD7	0x00	Measured value damping	R/W	2 Byte	0 1000 in 10ms steps	1	ms	0

8. Maintenance

	- Airborne parts, leaking fluid, electric shock - Always service the device in a depressurized and de-energized condition!
	- due to aggressive fluids - Wear suitable protective clothing, e.g. gloves, safety goggles.



In principle, the device requires no maintenance. If necessary, clean the housing of the device using a moist cloth and a non-aggressive cleaning solution.

Cleaning of the diaphragm:
Deposits or contamination may occur on the diaphragm in case of certain fluids. It is recommended to establish appropriate maintenance intervals for checking purposes, combined with a functional check.

Clean the diaphragm cautiously using a non-aggressive cleaning solution and a soft paintbrush or sponge. If the diaphragm is calcified, it is recommended to have the decalcification performed by AFRISO. Please note the chapter "Service/Repair" with regard to this.

NOTE –Wrong cleaning may damage the measuring cell beyond repair. Do not use any sharp or pointed item.

9. Removal from Service

	- Airborne parts, leaking fluid, electric shock - Always dismount the device in a depressurized and de-energized condition!
	- due to aggressive fluids. - Wear suitable protective clothing, e.g. gloves, safety goggles.

NOTE – After dismantling, mechanical connections must be fitted with protective caps.

10. Service/Repair


Information on service / repair:

- www.afriso.com
- info@afriso.com
- Service phone: +49 7135 102-211

10.1 Recalibration

The offset value or range value may shift during the life of the device. In this case, a deviating signal value in relation to the set lower or upper measuring range value is output. If one of these two phenomena occurs after extended use, a recalibration in the factory is recommended. Please note the chapter "Service/Repair" with regard to this.


10.2 Return

	- due to pollutants - Wear suitable protective clothing, e.g. gloves, safety goggles
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For every return shipment, whether for recalibration, decalcification, alteration or repair, the device must be cleaned thoroughly and packed in a break-proof manner. A return declaration with a detailed fault description must be added to the defective device. If your device has come into contact with pollutants, a declaration of decontamination is additionally required. Appropriate templates can be found on our homepage. Download these by accessing www.afriso.com or request them by e-mail or phone: info@afriso.com | Fon: +49 7135 102-211

In case of doubt regarding the fluid used, devices without a declaration of decontamination will only be examined after receipt of an appropriate declaration.

11. Disposal

	- due to pollutants - Wear suitable protective clothing, e.g. gloves, safety goggles
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The device must be disposed of according to the European Directive 2012/19/EU (WEEE – Waste electrical and electronic equipment). Waste equipment must not be disposed of in household waste!

NOTE –Dispose of the device properly!

12. Warranty terms

The warranty terms are subject to the legal warranty period of 24 months, valid from the date of delivery. If the device is used improperly, modified or damaged, we will rule out any warranty claim. Any damaged diaphragm will not be accepted as a warranty case. Likewise, there shall be no entitlement to any warranty claim if the defects have arisen due to normal wear and tear.

13. EU Declaration of Conformity / CE

The delivered device meets the legal requirements. The applied Directives, harmonized standards and documents are listed in the EU Declaration of Conformity valid for the product. It can be found under <http://www.afriso.com>. In addition, the operational safety of the device is confirmed by the CE sign on the type plate.

Part 2/2 relating to the Translation of the Original Operating Manual for

EDS 10

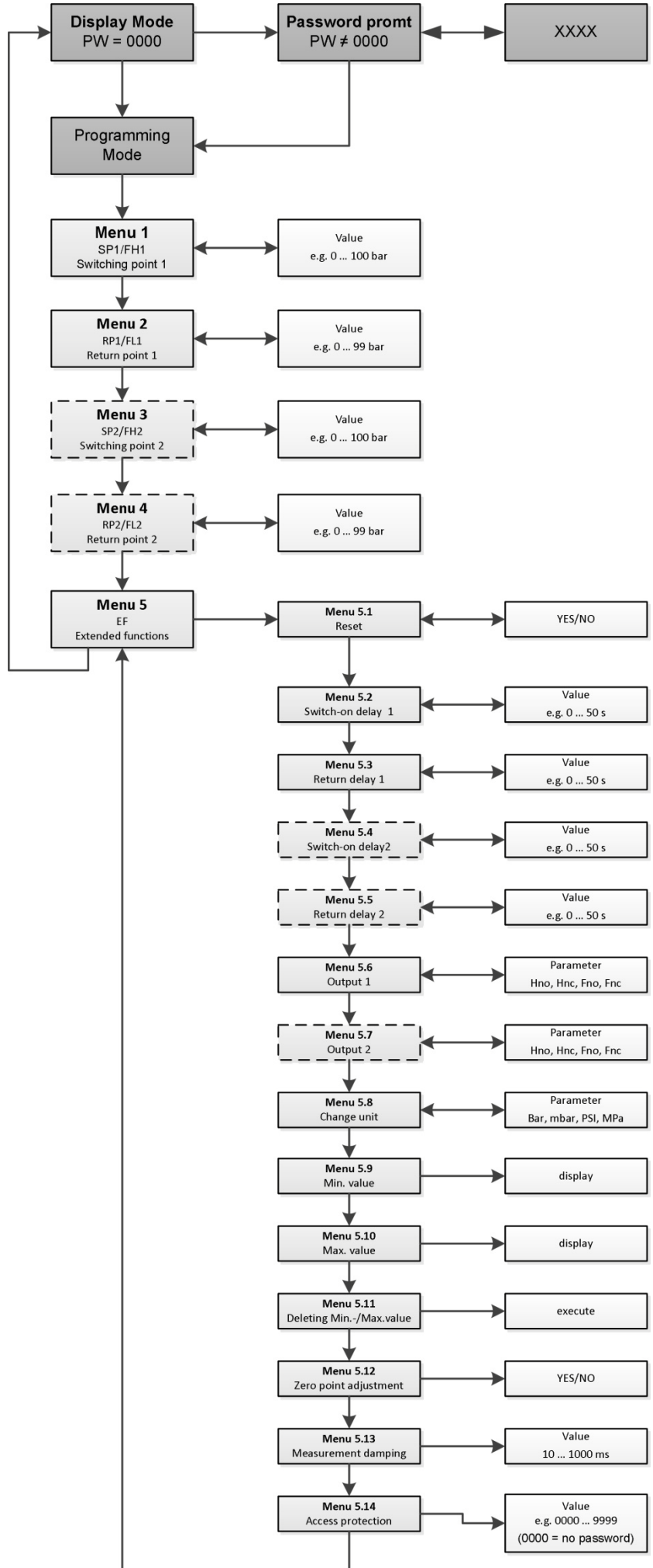
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Use of the menu



1. Call up the menu 1 by using the left button.
2. Have the values for the switching point 1 displayed by using the right button. The selected value will flash.
3. Select a value by using the left button. Acknowledge the selected value by using the right button and return to the menu 1.
4. Call up the next menu by using the left button; then set/adjust the value as described in nos. 2 and 3 above.
5. Call up the menu 5 by using the left button
6. Call up the first submenu 5.1 by using the right button; then set/adjust the value as described in nos. 2 and 3 above.

Note

If no button is pressed for a period of 60 s, the program will return to the display without storing the changed value.

The menus surrounded by dashed lines do not exist in case of sensors with analog output.