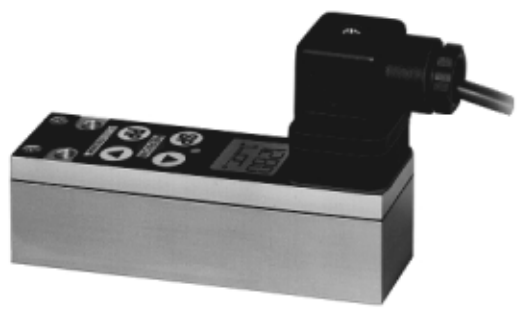
Fluidtronic - Pressure Switch 31 D

OBSOLETE DOCUMENT
Technical Reference Only

Electronic pressure switch
for applications in pneumatics
Switching pressure range: 0 ... 25 bar

Description

The Fluidtronic 31 D pressure switches are electronic devices for pressure monitoring and open- and closed-loop control functions. The switches consist essentially of a pressure input with a built-in pressure sensor, an integral electronic evaluation unit.



Type 31 D

Features

- Switching-pressure difference does not depend on the switching point setting
- Switching points can be set without applied system pressure (independent of place of installation)
- Switching status indicated by LED
- Switching time < 5 ms
- Long service life
- Very convenient to operate
- Indication of system pressure
- Adjustable hysteresis
- Switching window adjustable (window mode)
- Shock-proof up to 25 g

Applications

- Pneumatic control systems
- Press systems
- Welding machines
- Packaging and filling machines
- Test systems
- Clamping systems
- Plastic injection-moulding machines
- Robotics and handling industry

Publication 7503126.06.04.98

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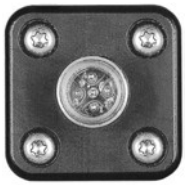
General technical data	
Switching point:	Adjustable from 0 - 100 % of FS value
Reset point:	Adjustable from 0 - 100 % of FS value
Display format:	3 1/2 digit
Linearity error:	< 0.5 % of FS value
Permissible fluids:	Filtered compressed air, lubricated or unlubricated
Mounting position:	As desired
Ambient temperature:	- 10 to + 60°C
Fluid temperature:	- 10 to + 60°C
Temperature sensitivity of zero point:	0.4 % of FS value/10 K
Temperature sensitivity of span:	0.2 % of FS value/10 K
Degree of protection to DIN 40050:	IP 65 (applies with electrical connector socket fitted)
Resistance to shock	25 g

Electrical data	
Electrical connection:	3-pin + PE to DIN 43650
Power supply (polarity-safe):	18 to 32 VDC
Permissible residual ripple:	10% (within range 18 to 32 V)
Current consumption:	< 50 mA (plus load current)

Switching output	
Type of switching:	Non-floating open collector switching to U_B, suitable for inductive load
Output voltage:	Supply voltage - 1.5 V
Contact rating:	I_{max} = 1 A (short-circuit-proof)
Switching time:	< 5 ms
Service life:	100 million switching cycles
Switching logic:	Signal with rising pressure when SP > RP Signal with falling pressure when SP < RP

Electromagnetic compatibility	
Interference emission:	Conforms to EN 50081. Part 2
Interference immunity:	Conforms to EN 50082. Part 2

Electrical connectors

	electrical connection **DIN 43650**
	electrical connection **M 12 x 1**

Characteristic data

for Pneumatic applications,
electrical connection DIN 43650,
housing of zinc diecast.

Switching pressure range [bar]	Max. pressure [bar]	Fluid connection	Type of fluid connection	Variation encodable	Variation not encodable	Step size of display [bar]	Cat. No.
–1 ... 1	10	G 1/4	Female	x		0,01	**VH 0886110**
–1 ... 1	10	G 1/4	Female		x	0,01	**VH 0886100**
–1 ... 1	10	–	Flange	x		0,01	**VH 0885110**
–1 ... 1	10	–	Flange		x	0,01	**VH 0885100**
0 ... 10	30	G 1/4	Female	x		0,04 / 0,05	**VH 0886610**
0 ... 10	30	G 1/4	Female		x	0,04 / 0,05	**VH 0886600**
0 ... 10	30	–	Flange	x		0,04 / 0,05	**VH 0885610**
0 ... 10	30	–	Flange		x	0,04 / 0,05	**VH 0885600**
0 ... 25	40	G 1/4	Female	x		0,1	**VH 0886710**
0 ... 25	40	G 1/4	Female		x	0,1	**VH 0886700**
0 ... 25	40	–	Flange	x		0,1	**VH 0885710**
0 ... 25	40	–	Flange		x	0,1	**VH 0885700**

Characteristic data

for neutral gasous and liquid fluids,
electrical connection DIN 43650,
housing anodixed aluminium (Seawater resistant).

Switching pressure range [bar]	Max. pressure [bar]	Fluid connection	Type of fluid connection	Variation encodable	Variation not encodable	Step size of display [bar]	Cat. No.
–1 ... 1	10	G 1/4	Female		x	0,01	**VH 0886140**
–1 ... 1	10	G 1/4	Female	x		0,01	**VH 0886141**
0 ... 10	30	G 1/4	Female		x	0,04 / 0,05	**VH 0886640**
0 ... 10	30	G 1/4	Female	x		0,04 / 0,05	**VH 0886641**
0 ... 25	40	G 1/4	Female		x	0,1	**VH 0886740**
0 ... 25	40	G 1/4	Female	x		0,1	**VH 0886741**

Characteristic data

for Pneumatic applications,
electrical connection DIN 43650,
housing of zinc die cast,
display PSI reading.

Switching pressure range [PSI]	Max. pressure [PSI]	Fluid connection	Type of fluid connection	Variation encodable	Variation not encodable	Step size of display (PSI)	Cat. No.
–14,7 ... +15	150	1/4 NPT	Female	x		0,1/0,2	**VH 0886121**
–14,7 ... +15	150	1/4 NPT	Female		x	0,1/0,2	**VH 0886120**
0 ... 150	440	1/4 NPT	Female	x		1	**VH 0886621**
0 ... 150	440	1/4 NPT	Female		x	1	**VH 0886620**
0 ... 350	580	1/4 NPT	Female	x		2	**VH 0886721**
0 ... 350	580	1/4 NPT	Female		x	2	**VH 0886720**

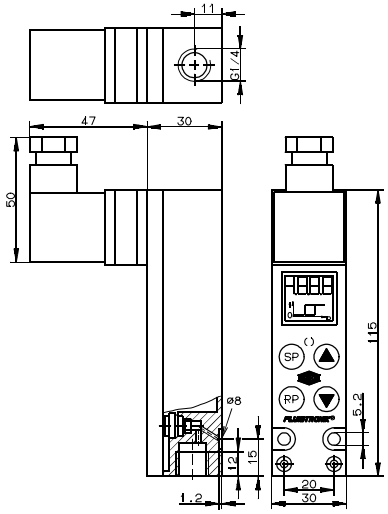
Characteristic data

for neutral gasous and liquid fluids,
electrical connection M 12 x 1,
housing anodixed aluminium (Seawater resistant).

Switching pressure range [bar]	Max. pressure [bar]	Fluid connection	Type of fluid connection	Variation encodable	Variation not encodable	Step size of display [bar]	Cat. No.
–1 ... 1	10	G 1/4	Female	x		0,01	**VH 0886143**
–1 ... 1	10	G 1/4	Female		x	0,01	**VH 0886142**
0 ... 10	30	G 1/4	Female	x		0,04 / 0,05	**VH 0886643**
0 ... 10	30	G 1/4	Female		x	0,04 / 0,05	**VH 0886642**
0 ... 25	40	G 1/4	Female	x		0,1	**VH 0886743**
0 ... 25	40	G 1/4	Female		x	0,1	**VH 0886742**

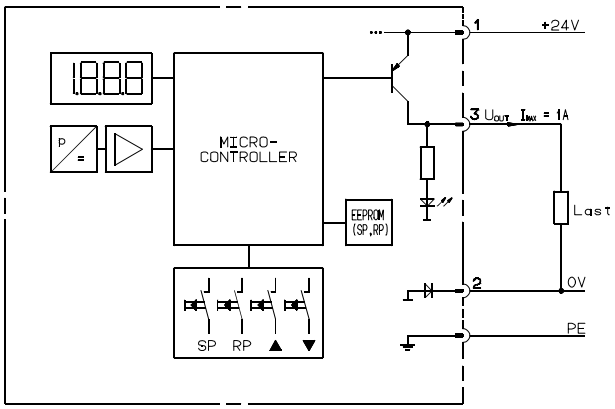
Dimensional drawing (mm)

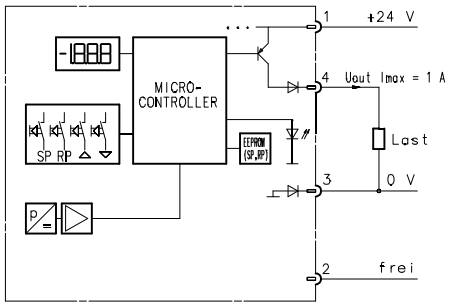
Connection
DIN 43650



Connection
M 12

Block circuit diagram





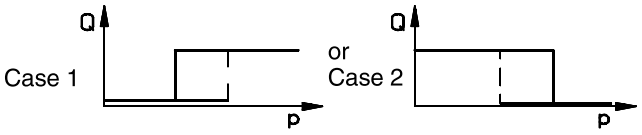
Characteristic data

for Pneumatic applications,
electrical connection M 12 x 1,
housing zinc die cast.

Switching pressure range [bar]	Max. pressure [bar]	Fluid connection	Type of fluid connection	Variation encodable	Variation not encodable	Step size of display [bar]	Cat. No.
–1 ... + 1	10		Flange		x	0,01	**VH 0885160**
–1 ... + 1	10		Flange	x		0,01	**VH 0885161**
–1 ... + 1	10	G 1/4	Female		x	0,01	**VH 0886160**
–1 ... + 1	10	G 1/4	Female	x		0,01	**VH 0886161**
0 ... 10	30		Flange		x	0,04 / 0,05	**VH 0885660**
0 ... 10	30		Flange	x		0,04 / 0,05	**VH 0885661**
0 ... 10	30	G 1/4	Female		x	0,04 / 0,05	**VH 0886660**
0 ... 10	30	G 1/4	Female	x		0,04 / 0,05	**VH 0886661**
0 ... 25	40		Flange		x	0,1	**VH 0885760**
0 ... 25	40		Flange	x		0,1	**VH 0885761**
0 ... 25	40	G 1/4	Female		x	0,1	**VH 0886760**
0 ... 25	40	G 1/4	Female	x		0,1	**VH 0886761**

Adjusting the switching points and switching pressure differences

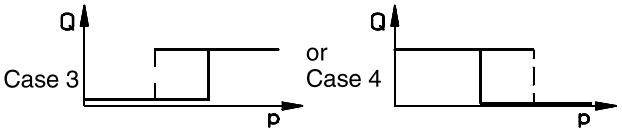
a) Adjusting the switching point:



Press the **SP** button and hold it. The display will show the previous switch-on pressure setting, and the dotted bar will flash as long as **SP** is pressed down.

You can now use ↑ ↓ to adjust the switching point upwards or downwards. If a cursor key is held down, the values will change faster. When the cursor key is released again, the switch-on pressure setting will cease to change. This setting is stored and activated when **SP** is reclased, after which the display will show the current pressure value and the bar will
cease to flash.

b) Adjusting the reset point:



Press **RP** and hold it. The display will show the previous switch-off pressure setting, and the dotted bar will flash as long as the button is pressed down.

You can now use ↑ ↓ to adjust the reset point in the same way as described above.

During both adjustment operations, it may occur that the hysteresis graph changes from one state to another at the time a transition is made through the point »Switch-on pressure = Switch-off pressure«. When both switching points are correctly set, the hysteresis graph will also be correct. You can change between **SP** and **RP** as often as you wish until the setting is correct.

c) Adjusting the access protection:

Encoding: The pressure switches can be protected against unauthorised access by means of a code.
In order to reach the encoding mode, both **SP** and **RP** must be pressed simultaneously before the power supply is switched on. Release these buttons again after the power supply has been switched on and the display test has run. The display will then show »Cod«. If a code has been entered previously, this must be keyed in first. Only then is it possible to enter a new code.
The code consists of the combination of SP, RP, ↑, ↓. The individual combination should be entered in succession. Each time a button is pressed, »–« will appear in the display. When the display shows
» – – – – «, this indicates that the complete code has been entered and can then be stored by pressing **SP.**
The switching and reset pressures can now be adjusted only after the code has been entered.

Once the access protection has been activated, the switching or reset points will still be shown in the display when the relevant button is pressed, but if an attempt is made to change the setting (by means of a cursor key), the display will show »Cod«. The access code must now be entered. If the entries correspond with the code, the adjustment is carried out as described above (both thresholds can now be changed at will.

d) Deactivating the access protection:

In order to delete a code, **SP** and ↑ must be pressed simultaneously before the power supply is
switched on.
Release these buttons again after the power supply has been switched on and the display test run. The display now shows "Cod" and the existing code must be entered. The display will now show CLC. After that the pressure sensor is no longer protected against unauthorized access.

e) Setting the buffering time:

In order to prevent every single pressure change from being evaluated, a buffering time can be entered. The effect of this is that pressure changes are then evaluated only if the pressure signal in question is present for longer than the preset buffering time. In order to set a buffering time, press **SP** before the power supply is switched on. Release **SP** again after the power supply has been switched on. The display will now show the buffering time im milliseconds (e.g. t01).
Use ↑ ↓ to change the buffering time to 03, 06, 12 or 24 ms and then store the setting by pressing **SP.**

f) Setting the pressure switch to ambient pressure = 0

Press **RP** before the power supply is switched on. Release this button again after the power supply has been switched on and the display test run. The display will now show OFS. The ↑ ↓ can be used to set the pressure display to 0. The setting can now be stored by pressing **SP.**

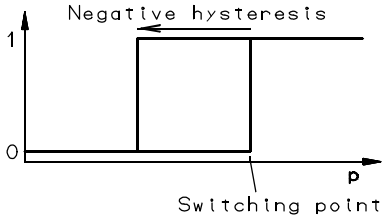
g) Hysteresis mode

If it is desired to operate with a fixed hysteresis instead of the reset point, this hysteresis can be selected as desired:
Press both **SP** and ↓ simultaneously before switching on the power supply and release them again after the power supply has been switched on and the display test run. The display will now show the operating mode. By means of ↓ ↑ it is now possible to change the operating mode until HYS appears on the display. The set operating mode must now be stored by pressing **SP.**
By pressing **SP** again, the set switching point is displayed. It can be changed by means of the cursor keys ↑ ↓.

A negative hysteresis means:
Signal with rising pressure/**Case 1**

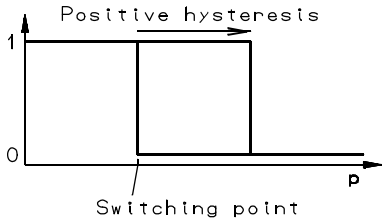
A positive hysteresis means:
Signal with falling pressure/**Case 2**

Case 1



If the switching point is now changed, the reset point is automatically changed as well, that is by the value of the set hysteresis.

Case 2



h) Window mode

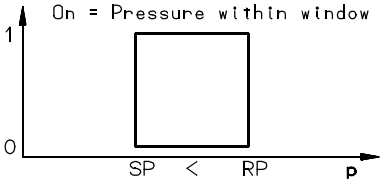
If the pressure is to be monitored within a certain range, a switching window can be set for this purpose. The pressure switch will then indicate whether the actual pressure lies above or below the monitored range.
In order to set a switching window, press both **SP** and ↓ simultaneously before switching on the power supply. Release them again after the power supply has been switched and the display test run. The display will now show the operating mode.

By using of ↓ ↑ it is now possible to change the operating mode until FEn is shown in the display. Now use **SP** to set the operating mode. After that, **SP** can be used to indicate the set switching point which then can be changed by means of ↓ ↑.

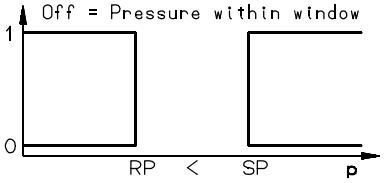
The distance between the switching point and the reset point is represented by the switching window. If the switching point is lower than the reset point, a signal will be output as long as the pressure lies within the set window (Case 1).

If the switching point is higher than the reset point, a signal will be output as soon as the pressure lies above or below the set window (Case 2).

Case 1



Case 2

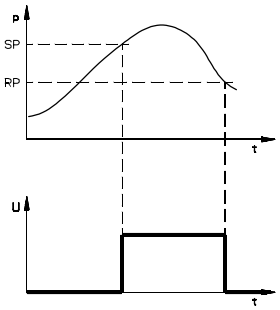


Operating modes:

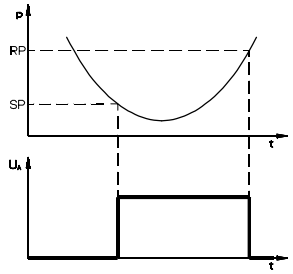
Std	=	Standard mode. Switching point and reset point are adjustable
HYS	=	Hysteresis mode. Switching point and hysteresis are adjustable
FEn	=	Window mode. Switching window is adjustable

Pressure and voltage graphs

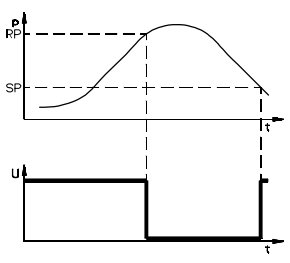
Signal with **rising** pressure
Setting SP > RP



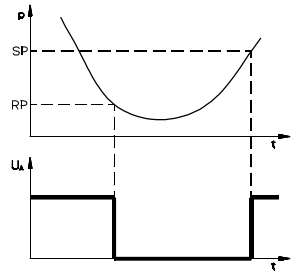
Signal with **falling** pressure
Setting SP < RP



Inverted Signal with **rising** pressure
Setting RP > SP



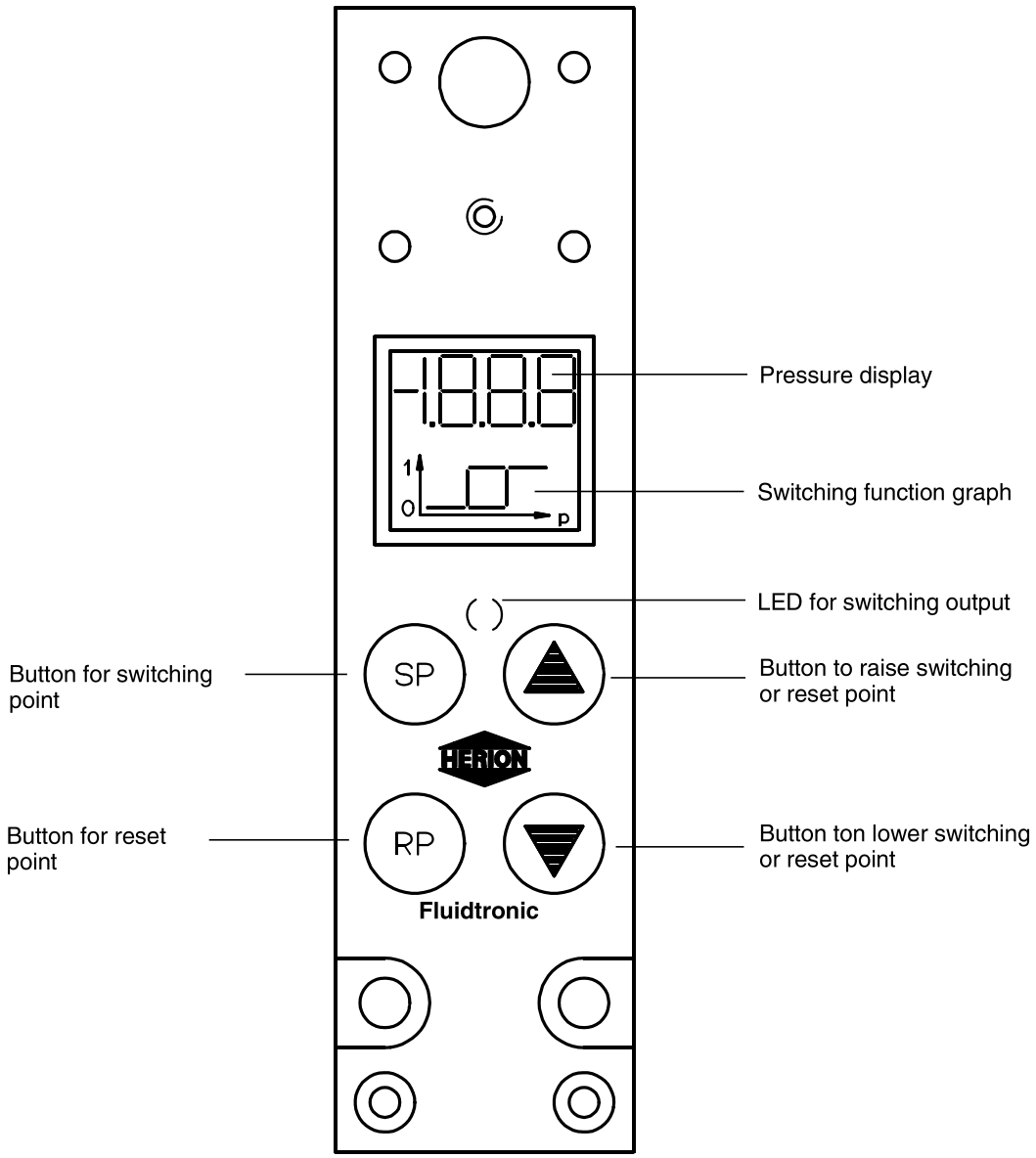
Inverted Signal with **falling** pressure
Setting RP < SP



SP = Switching point
RP = Reset point

Layout of operator controls

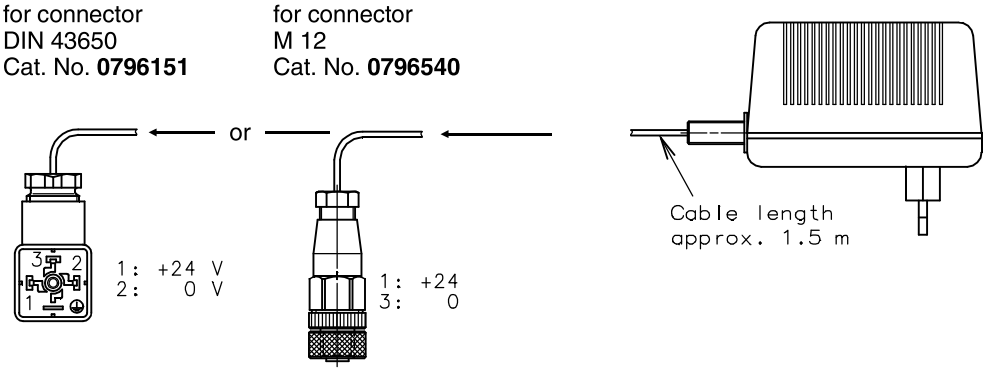
Fluidtronic pressure switch 31D



Power supply for demonstration / setting of points

for connector
DIN 43650
Cat. No. **0796151**

for connector
M 12
Cat. No. **0796540**



Pressure switches 31 D
List of error messages

Display of hardware errors or malfunctions:		
Display	Meaning	Cause / Remedy
O.Er	Output error	Error at switching output: Circuit-breaker defective, feedback loop to processor open circuit. Repair necessary.
E.Er	E^2PROM error	E^2PROM module defective or connection to processor faulty. Repair necessary.
I.Er	Initialisation error	Checksum of initialisation data incorrect. Remedy: Call up any SETUP function and acknowledge the setting with SP. This error message is caused by a data error. All setup values should therefore be checked and corrected if necessary.
C.Er	Calibration error	Checksum of calibration data incorrect. Recalibration necessary.
SC.L	Short-circuit low	Short-circuit between output and ground. Check wiring: Power supply may be too weak for connected load (leading to collapse of voltage, particularly with loads with a high switch-on current such as incandescent lamps or capacitances).
UFL	Underflow	The applied pressure is below the measuring range: Increase pressure until it is within the measuring range.
OFL	Overflow	The applied pressure is above the measuring range: Decrease pressure until it is within the measuring range.
Display of hardware errors or malfunctions (can be switched off):		
SC.H	Short-circuit high	Short-circuit between output and power supply. Check wiring. If the switching line from the load (e.g. electrical control device, PLC or similar) is being maintained at an open-circuit potential of > 3 V, or if several pressure switches are being operated in parallel, this function should be switched off. Disconnection: ↓ during display test, then adjust with ↓ or ↑
U.Lo	Voltage low	Power supply voltage too low (Vcc <17 V). Check power supply: Load may be too large. Disconnection: ↑ during display test, then adjust with ↓ or ↑
Messages generated by calling SETUP functions:		
Cod	Meaning	Requested code or code programming
CLC	Clear code	Deletion of current code
txx	Delay time	Setting of filter time constant xx = Switching output delay xx ∈ {03, 06, 12, 24, 50} in ms and xx ∈ {0.1, 0.2, 0.4} in s.
OFS	Offset	Request for offset adjustment using ↑ and ↓ buttons.
SC.H U. LO OFF	Short-circuit high Voltage low Off	Short-circuit monitoring activated Voltage monitoring activated Short-circuit or voltage monitoring deactivated.
Std HYS FEn	Standard mode Hysteresis mode Window mode	Standard mode activated Hysteresis mode activated Window mode activated