FLEX-P1,FLEX-DP1
Ввинчиваемые датчики (преобразователи) давления GHM MESSTECHNIK

Технические характеристики

Pressure Transmitter / Switch FLEX-P1

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FLEX-P1

- **Ceramic cell made from Al_2O_3**
- **Switching output and/or analog output (4..20 mA / 0..10 V)**
- **Ingress protection IP 67**
- **Infinitely adjustably rotatable cable outlet for clean alignment**
- **Robust stainless steel housing**

Characteristics

The pressure transducers in this range measure pressures in liquids and gases. They output the measured value as an analog signal, or indicate that an adjustable limit value has been exceeded or fallen short of, by means of an electronic switch. Combinations of analog output and limit switches are also available. Alternatively, the switching output can be implemented as a frequency output.

The robust 100% metal construction makes it suitable for universal industrial use.

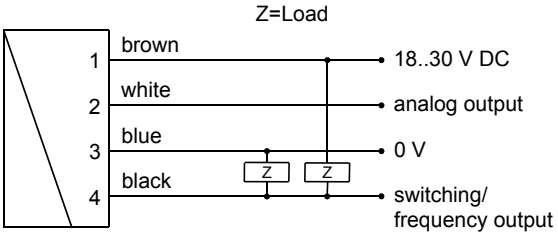
The sensor is an economical ceramic thick film cell which protects from damage because of its non-flush construction, and is built extremely robustly.

For models with a limit switch, the desired limit value is set by using a magnet to activate a magnetic switch when the applied pressure is at the limit value.

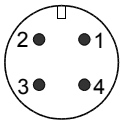
Technical data

Sensor	ceramic cell with measuring bridge using thick film technology
Process connection	male thread G $^1/_4$ A, G $^1/_2$ A (optionally with female thread)
Metering ranges	(relative pressure, differential pressure compared with environment) in bar Range — Burst pressure 0.. 1 — 4 0.. 2 — 4 0.. 5 — 10 0.. 10 — 20 0.. 20 — 40 0.. 50 — 100 0..100 — 175 * available only on request for gases
Measurement accuracy	±1 % of full scale value, plus 0.05 %/K at < 0 °C and > 60 °C
Repeatability	±0.5 % of full scale value
Pressure resistance	corresponds to metering range
Dynamics	measuring cycle 50 ms
Media temperature	-20..+70 °C (as high temperature model with gooseneck, max. 120 °C)
Ambient temperature	-20..+70 °C
Storage temperature	-20..+80 °C
Media	fluids and gases
Materials medium-contact	stainless steel 1.4571 ceramic Al_2O_3, FKM
Materials non-medium-contact	stainless steel 1.4305 (housing) PA6.6 (plug), gold-plated contacts
Supply voltage	18..30 V DC
Power consumption	< 1 W
Analog output	4..20 mA or 0..10 V DC
Switching output	transistor output "push-pull" (resistant to short circuits and polarity reversal) I_{out} = 100 mA max.
Hysteresis	2 % F.S., for Min-switch, position of the hysteresis above the limit value, and for Max-switch, below the limit value
Display	yellow LED (On = Normal / Off = Alarm / Rapid flashing = Programming)
Electrical connection	for round plug connector M12x1, 4-pole
Reversal polarity protected	yes
Ingress protection	IP 67
Weight	approx. 0.3 kg
Conformity	CE

Wiring



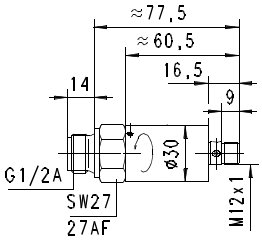
Connection example: PNP NPN



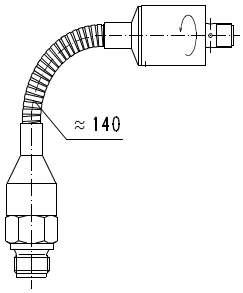
Before the electrical installation, it must be ensured that the supply voltage corresponds with the data sheet.

It is recommended to use shielded wiring.

Dimensions



"Gooseneck" option for higher temperatures



Handling and operation

Installation

The pressure sensors are screwed into a nozzle or a T-piece in the pipework, using a suitable sealing material (e.g. Klingerit). The installation of the pressure sensor should result in no significant reduction of the cross-section of the pipework. When tightening the pressure sensor, use only the hexagonal spanner (SW27) specifically provided. Avoid installation locations with high pressure surges (see burst pressure).

Avoid installation locations with high pressure surges (see overload limits).

In the high temperature model with flexible gooseneck, the pressure transducer can be operated up to a media temperature of 120 °C.

Programming

The electronics contain a magnetic contact, with the aid of which different parameters can be programmed. Programming takes place when a magnet clip is applied for a period between 0.5 and 2 seconds to the marking located on the label. If the contact time is longer or shorter than this, no programming takes place (protection against external magnetic fields).

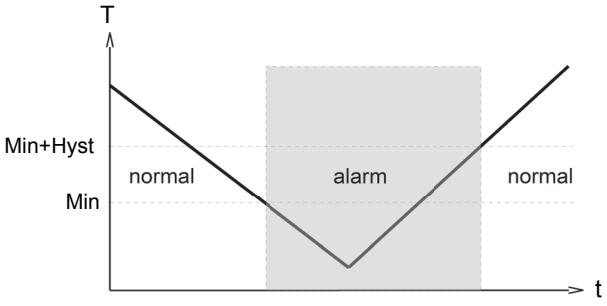
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

Example: The switching value is to be set to 70 % of the metering range, because at this flow rate a critical process status is to be notified. However, only 50% can be achieved without danger. In this case, the device would be ordered with a "teach-offset" of +20 %. At 50 % in the process, a switching value of 70 % would then be stored during "teaching".

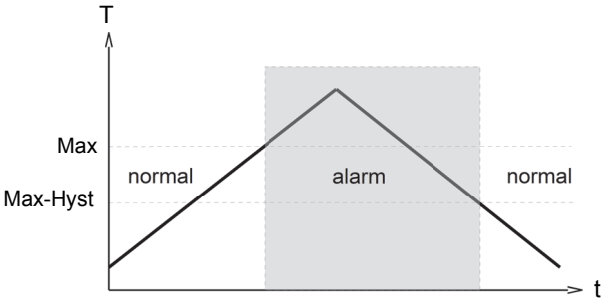
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

The limit switch can be used to monitor minimal or maximal.

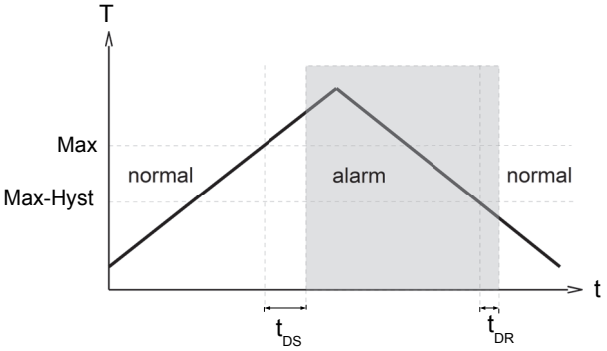
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



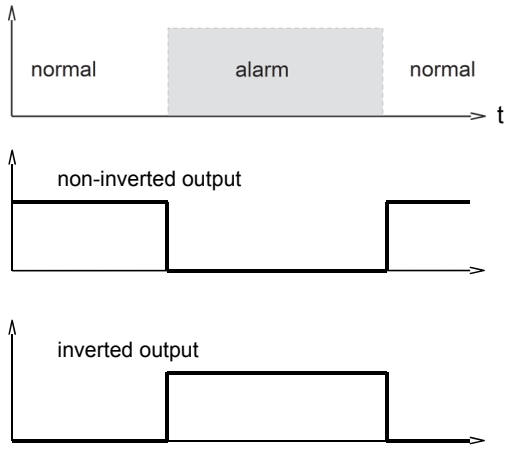
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.
In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



A Power-On delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Combinations with FLEX

FLEX-converter / counter can be combined with very different types of pickup systems for flow rate, level, temperature, and pressure. This has created a family of sensors with which different types of applications can be supported.

Ordering code

	1.	2.	3.	4.	5.	6.	7.	8.	9.
FLEX-P1		**R**	**K**		**H**				

❍ = Option

1.	**Metering range**		
	001	0.. 1 bar	
	002	0.. 2 bar	
	005	0.. 5 bar	
	010	0.. 10 bar	
	020	0.. 20 bar	
	050	0.. 50 bar	
	100	0..100 bar	
2.	**Pressure type**		
	R	relative pressure	
3.	**Connection material**		
	K	stainless steel	
4.	**Mechanical connection**		
	015	G 1/2	
	008	❍ G 1/4	
5.	**Mechanical connection**		
	H	male thread	
6.	**Analog output**		
	I	current output 4..20 mA	
	U	voltage output 0..10 V	
	K	no analog output	
7.	**Switching output**		
	T	push-pull (compatible with PNP and NPN)	
	K	no switching output	
	M	❍ NPN (open collector)	
8.	**Function set to switching output**		
	L	minimum-switch	
	H	❍ maximum-switch	
	R	frequency output	
	K	no switching output	
9.	**Switching output level**		
	O	standard	
	I	inverted	

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FLEX-P1

Options

Special range for analog output: ___ bar
(not greater than the sensor's working range)

Special range for frequency output: ___ bar
(not greater than the sensor's working range)

End frequency (max. 2000 Hz) ____ Hz

Switch-on delay (from Alarm to OK) ___ s

Switch-off-delay (from OK to Alarm) ___ s

Power-on delay (0..99 S) ___ s
(time after power on, during which the outputs are not actuated)

Switching output fixed ___ bar

Special hysteresis (standard = 2 % EW) ___ %

Gooseneck (at temperatures over 70 °C) ☐

Accessories

- Cable/round plug connector (KB...) see additional information “Accessories”
- Converter / counter OMNI-TA
- Device configurator ECI-1

Differential Pressure Transmitter / Switch FLEX-DP1

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FLEX-DP1

Characteristics

The FLEX-DP1 differential pressure transmitter / switch is intended for the measurement of differential pressures in liquids and gases. It consists of a differential pressure cell as a sensor, and an integrated transformer.

The differential pressure measuring cell has two separate ceramic pressure sensors with a measuring bridge applied by thick film technology. The bridge signal of each sensor is temperature-compensated. The integrated microcontroller measures the signals from the two sensors, and calculates the pressure difference. This is output as an analog signal (0/4..20 mA or 0/2..10 V). In addition, if a set limit value is fallen short of or exceeded, this can be signalled by means of a switching output. Alternatively the electronic switch (push-pull) can be used as a frequency output.

The ceramic sensors are available in various pressure ranges. This limits the maximum pressure applied to each connection. The differential pressure, which should correspond to the maximum value of the output signal, can be freely selected within this range, but should not be less than 10 % of the metering range of the single cells, so that sufficient resolution and accuracy are ensured.

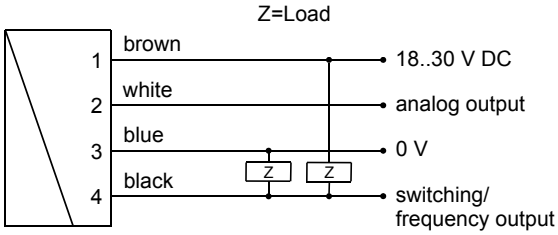
The microcontroller also permits customer-specific characteristic curves and output signals, e.g. measurement of positive and negative pressure differences (available on request).

The medium comes into contact exclusively with top-quality materials such as AL_2O_3 -ceramics, stainless steel, fluorocarbon O-rings.

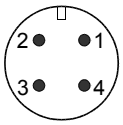
Technical data

Sensor	ceramic cell with measuring bridge using thick film technology
Process connection	2 x female thread G $^1/_8$
Metering ranges of the single cells	(pressure relative to environment of the single cell) in bar Range — Burst pressure 0.. 1 — 4 0.. 2 — 6 0.. 5 — 15 0.. 10 — 40 0.. 20 — 60 0.. 50 — 150 0..100 — 280 others on request
Differential pressure range	which can be set on the device, maximum: Metering range of the single cells
Measurement accuracy	±1 % of full scale value, plus 0.05 %/K at < 0 °C and > 60 °C
Repeatability	±0.5 % of full scale value
Pressure resistance	corresponds to metering range
Dynamics	measuring cycle 50 ms
Media temperature	-20..+70 °C
Ambient temperature	-20..+70 °C
Storage temperature	-20..+80 °C
Media	fluids and gases
Materials medium-contact	Connection — 1.4571 Ceramic cell — Al_2O_3 Seal — FKM
Materials non-medium-contact	al anodised, 1.4305 (housing) PA6.6 (plug), gold-plated contacts
Supply voltage	18..30 V DC
Power consumption	< 1 W
Analog output	4..20 mA or 0..10 V DC
Switching output	transistor output "push-pull" (resistant to short circuits and polarity reversal) I_{out} = 100 mA max.
Hysteresis	2 % F.S., for Min-switch, position of the hysteresis above the limit value, and for Max-switch, below the limit value
Display	LED-signal lamp in the connector output (only for switching output)
Electrical connection	for round plug connector M12x1, 4-pole
Reversal polarity protected	yes
Ingress protection	IP 67
Weight	approx. 0.7 kg
Conformity	CE

Wiring



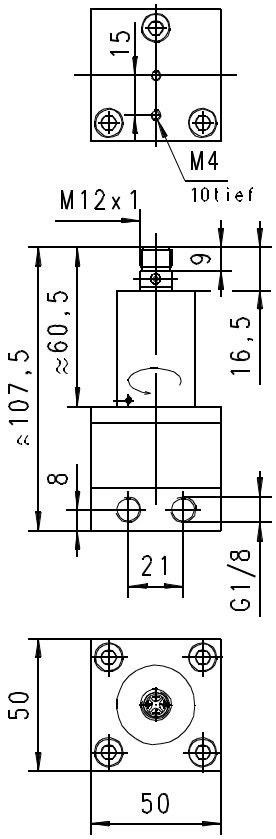
Connection example: PNP NPN



Before the electrical installation, it must be ensured that the supply voltage corresponds with the data sheet.

It is recommended to use shielded wiring.

Dimensions



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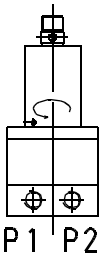
FLEX-DP1

Handling and operation

Installation

Connect the pipework to P1 and P2. When sealing off, ensure that it is carried out cleanly.
The standard version is designed for P1 > P2. However, if the connections are reversed, no damage occurs.



When cleaning the pressure cells from the media side, the bolts of the part with the media connections are to be loosened The electronics remain closed in this case). Cleaning should be carried out very carefully, using a cotton tips.

Programming

The electronics contain a magnetic contact, with the aid of which different parameters can be programmed. Programming takes place when a magnet clip is applied for a period between 0.5 and 2 seconds to the marking located on the label. If the contact time is longer or shorter than this, no programming takes place (protection against external magnetic fields).

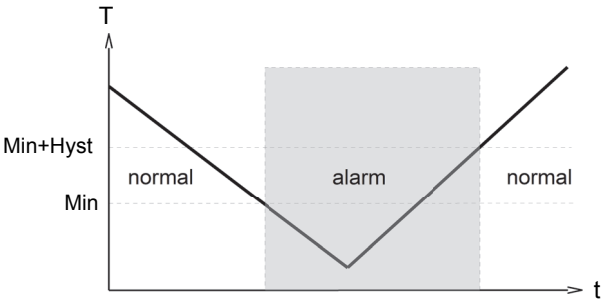
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

Example: The switching value is to be set to 70 % of the metering range, because at this flow rate a critical process status is to be notified. However, only 50% can be achieved without danger. In this case, the device would be ordered with a "teach-offset" of +20 %. At 50 % in the process, a switching value of 70 % would then be stored during "teaching".

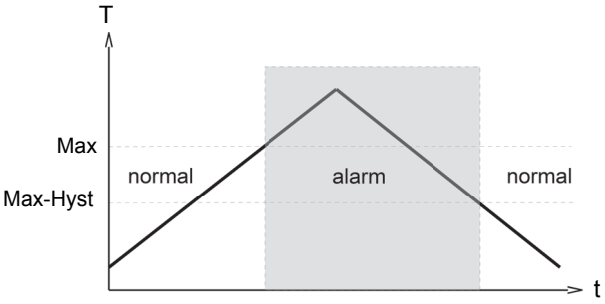
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

The limit switch can be used to monitor minimal or maximal.

With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



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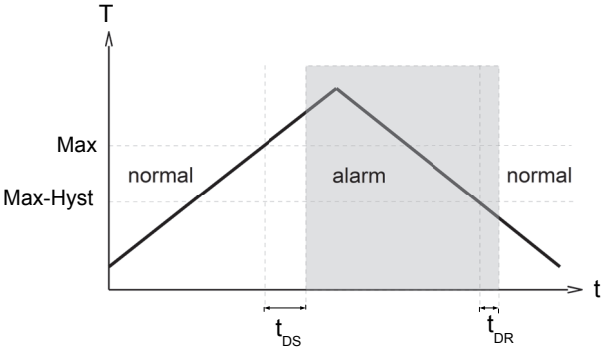
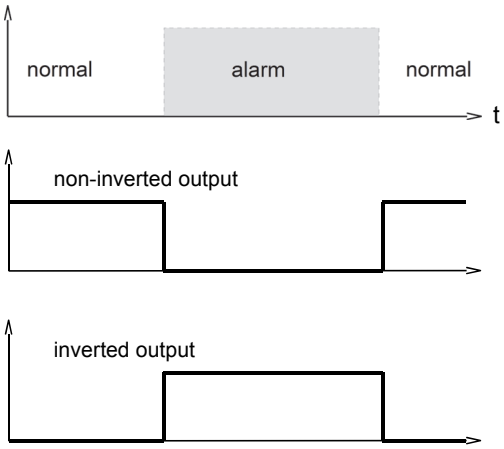


In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.
In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



A Power-On delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Combinations with FLEX

FLEX-converter / counter can be combined with very different types of pickup systems for flow rate, level, temperature, and pressure. This has created a family of sensors with which different types of applications can be supported.

Ordering code

	1.	2.	3.	4.	5.	6.	7.	8.	9.
FLEX-DP1		**R**		**K**	**004**				

❍ = Option

1.	**Range of the single cell**	
	001	0.. 1 bar
	002	0.. 2 bar
	005	0.. 5 bar
	010	0.. 10 bar
	020	0.. 20 bar
	050	0.. 50 bar
	100	0..100 bar
2.	**Pressure type**	
	R	relative pressure
3.	**Differential pressure range**	
	0001 … 1000	example 0055 = 5.5 bar (min. 10 %, max. 100 % of the range of the single cells)
4.	**Connection material**	
	K	stainless steel
5.	**Mechanical connection**	
	004	female thread G $^1/_8$
6.	**Analog output**	
	I	current output 4..20 mA
	U	voltage output 0..10 V
	K	no analog output
7.	**Switching output**	
	T	push-pull (compatible with PNP and NPN)
	K	no switching output
	M ❍	NPN (open collector)
8.	**Function set to switching output**	
	L	minimum-switch
	H ❍	maximum-switch
	R	frequency output
	K	no switching output
9.	**Switching output level**	
	O	standard
	I	inverted

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FLEX-DP1

Options

For analog output:

Special range for analog output:

Start of metering range (4 mA or 0 V) at ____.____ bar
Standard = 0 bar

End of metering range (20 mA or 10 V) at ____.____ bar
Standard = Maximum

For frequency output:

End frequency (max. 2000 Hz) ____ Hz
Standard = 2000 Hz

Special range for frequency output:

Start of metering range (0 Hz) at ____ bar
Standard = 0 bar

End of metering range (end frequency) at ____ bar
Standard = Maximum

For switching output:

Switching delay period (0.0..99.9 s) __.__ s
(from Normal to Alarm)

Switch-back delay period (0.0..99.9 s) __.__ s
(from Alarm to Normal)

Switching output fixed at ____.____ bar

Switching hysteresis __ %
Standard = 2 % of the metering range

General:

Power-On-Delay period (0..99 s) __ s

Teach-Offset ____.____ bar

Accessories

- Cable/round plug connector (KB...)
  see additional information “Accessories”
- Converter / counter OMNI-TA
- Device configurator ECI-1