Differential Pressure Switches

Sensor system: Stainless steel bellows
For neutral gaseous and liquid fluids
Differential pressure range 0.2 ... 16 bar
Working pressure range -1 ... 25 bar

NORGREN HERION

Catalog Register
A 19, P 19, H 19, D 8

Publication 750**0620**.06.04.99

OBSOLETE DOCUMENT
Technical Reference Only

Description (standard unit)

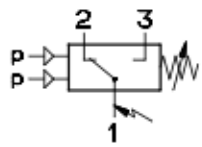
Differential pressure switch for air, gas, water, steam, oil, refrigerants.
Max. viscosity 1000 mm²/s

Repeatability:	± 1% of full scale value
Switching element:	Microswitch
Degree of protection	IP 65
Ambient temperature:	- 10 to + 80 °C
Fluid temperature:	- 20 to + 100 °C
Temperature at switching element:	+ 80 °C max.
Mounting position:	Optional
Vibrations:	4 g max. (sinusoidal) [1]

Type 7 DD

Features

- For precise control and monitoring of differential pressure. Vibrations should be avoided.
- Excellent sealing properties (leakage rate $<10^{-6}$ mbar · l · s^{-1})
- Works within a wide temperature range



Switching function:
Microswitch SPDT
Terminals 1 – 3: Contacts close on rising pressure,
Terminals 1 – 2: Contacts open on rising pressure

Parameters Switching pressure difference fixed

Differential pressure range [2] p_{vumin}...$p_{vo\,max}$ (VDI 3283) [bar]	Switching pressure difference Lower range [bar]	Upper range [bar]	Working pressure range [3] [bar]	Max. allowable pressure [4] [bar]	Switching cycles per minute	Pressure sensor materials Housing	Bellows	Other materials	Connection (internal thread)	Weight [kg]	Dimensional drawing Nr.	Cat. No.
0.2 ... 1	0.12	0.15	– 1 to 16	20	10	Brass 2.0401	St. st. 1.4404 (AISI316)	Soft solder	G 1/4	1.20	01	**0819100**
0.2 ... 1.6	0.12	0.17		20	10				G 1/4	1.20	01	**0819200**
0.25... 2.5	0.15	0.2		20	10				G 1/4	1.20	01	**0819300**
0.3 ... 4	0.2	0.25		20	10				G 1/4	1.20	01	**0819400**
0.5 ... 6	0.6	0.7	– 1 to 25	30	10				G 1/4	1.20	01	**0819500**
0.5 ... 10	0.7	0.8		30	10				G 1/4	1.20	01	**0819600**
0.5 ... 16	0.8	0.9		30	10				G 1/4	1.20	01	**0819700**

[1] Tested in accordance with DIN 89011, 5.2., within the frequency range 25...100 Hz; within the frequency range 2...25 Hz tested with amplitude 1.6 mm.
[2] The differential pressure is the pressure difference between both pressure sensing elements under operating conditions.
[3] The working pressure range indicates the required minimum pressure as well as the load on the pressure sensor under operating conditions.
[4] Even short pressure peaks must not exceed this value during actual operation (max. value = max. testing pressure).

Table of Contents Pneumatics
List of Catalog Numbers
Back

Parameters Switching pressure difference adjustable

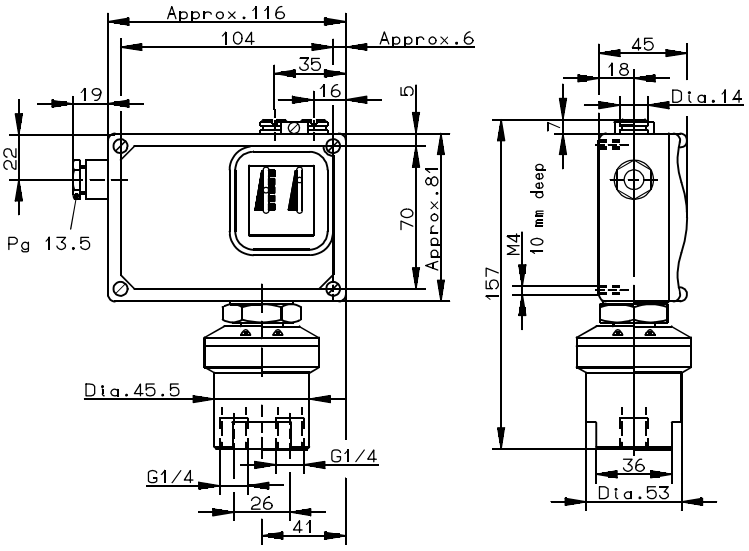
Differential pressure range[1]	Switching pressure difference		Working pressure range[2]	Max. allowable pressure[3]	Switching cycles per minute	Pressure sensor materials			Connection (internal thread)	Weight	Dimensional drawing	Cat. No.
						Housing	Bellows	Other materials				
$p_{vu\ min}$...$p_{vo\ max}$ (VDI 3283)	min.[4]	max.										
[bar]	[bar]	[bar]	[bar]	[bar]						[kg]	Nr.	
0.2 ... 1	0.35...0.4	1	– 1 to 6	20	10	Brass 2.0401	St. st. 1.4404 (AISI 316)	Soft solder	G 1/4	1.25	01	**0809100**
0.2 ... 1.6	0.40...0.4	1.5		20	10				G 1/4	1.25	01	**0809200**
0.25... 2.5	0.4 ...0.45	2.5		20	10				G 1/4	1.25	01	**0809300**
0.3 ... 4	0.45...0.5	4		20	10				G 1/4	1.25	01	**0809400**
0.5 ... 6	1.6...1.7	4	– 1 to 5	30	10				G 1/4	1.25	01	**0809500**
0.5 ... 10	1.7...1.8	8		30	10				G 1/4	1.25	01	**0809600**
0.5 ... 16	1.8...2	12		30	10				G 1/4	1.25	01	**0809700**

[1] The differential pressure is the pressure difference between both pressure sensing elements under operating conditions.
[2] The working pressure range indicates the required minimum pressure as well as the load on the pressure sensor under operation conditions.
[3] Even short pressure peaks must not exceed this value during actual operation (max. value = max. testing pressure).
[4] Maximum values; min. = beginning, max. = end of switching pressure range.

Other versions available on request

- With marine approval
- In protection class (Ex)d 3n G5
- Weatherproof design
- With electrical connector
- Microswitch with gold-plated contacts

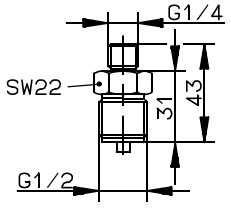
Dimensional drawing (mm)



Accessories

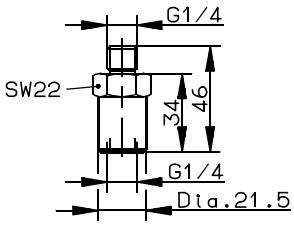
Reducer
G 1/4 toG 1/2
external thread

Cat. No. **0574767**



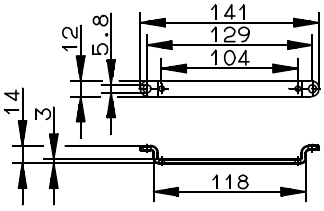
Surge damper
G 1/4

Cat. No. **0574773**



7 D mounting
support
(2 brackets and
4 screws)

Cat. No. **0574772**



Switch selection and mounting instructions

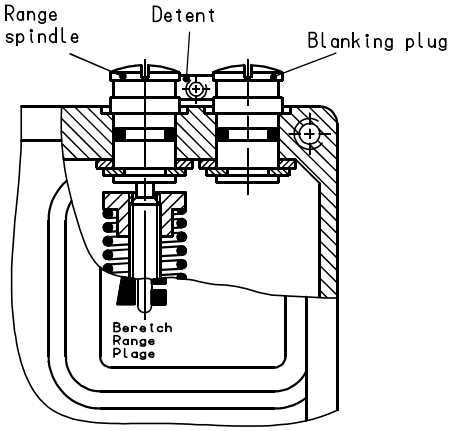
The switching points should normally be in about the middle of the adjustable range.
Observe switching pressure range, do not subject switch to max. allowable pressure during normal operation.
Do not exceed electrical ratings.
Electrical connection by a Pg 13.5 cable gland, in accordance with local regulations. For outdoor installation, sufficient protection has to be provided for. Critical conditions are: Aggressiveness of air, high or low temperatures, drastic changes in temperature, solar radiation, penetration of water. For liquid fluids with pressure peaks and/or pulsating pressure, install surge damper upstream to eliminate scattering of switching points and excessive wear, possible failure of differential setting. For steam, install condenser coil or water trap upstream.
When connecting, observe symbols on sensor (+) = higher-, (–) = lower system pressure.

Setting of the switching points

Use differential pressure spindle to set the upper or lower switching point on designs with **fixed** switching pressure difference.
The opposite one is determined by the fixed switching pressure difference.

Example:

Required switching point:	– with rising differential pressure:	2	bar
	– minus fixed switching pressure difference:	0.25	bar
	– results (with differential pressure falling) in the switching point of	1.75	bar
Adjustment with differential spindle:		1.75	bar
or			
Required switching point:	– with falling differential pressure:	2	bar
	– plus fixed switching pressure difference:	0.25	bar
	– results (with differential pressure rising) in the switching point of	2.25	bar
Adjustment with differential spindle:		2	bar



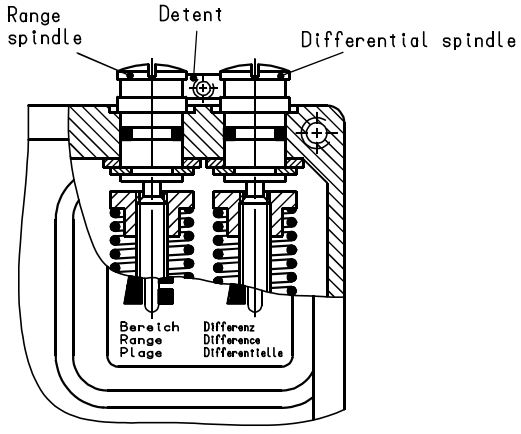
On designs with **adjustable** switching pressure difference, use the range spindle to set the lower switching point, then use differential spindle to set the upper switching point by adding the desired switching pressure difference.

Turning the range spindle anticlockwise shifts both switching points upwards. Turning the differential spindle anticlockwise shifts only the upper switching point upwards, i. e. the switching pressure difference (distance between the upper and lower switching points) increases.

Example:

Required switching points:	– with differential pressure rising:	3	bar
	– with differential pressure falling:	2	bar
	– i. e. switching pressure difference:	1	bar
Setting:	Range spindle	2	bar
	Differential spindle	1	bar
Switching possibilites	a) at the (+) pressure system, operating pressure constant =	9	bar
	at the (–) pressure system, switching points at operating pressure =	7	bar
	and	6	bar
	b) At the (–) pressure system, operating pressure constant	6	bar
	At the (+) pressure system, switching points at operating pressure =	8	bar
	and	9	bar

c) With variable operating pressures both at the (+)-, and the (–) pressure system, the switching points will be obtained as soon as the differential pressure reaches the value of the switching pressure difference.



To set precise switching points a pressure gauge is required. (The pressure switch is a switching and regulating device and not a measuring instrument – even if it has a scale to assist in the setting).
The setting can be changed at any time, even during operation.
Differential pressure and differential spindle are provided with a releasable detend; if desired, switch can also be leadsealed.

Making and/or breaking capacity

Change-over switch with silver spring contacts

Type of current	Type of load	Voltage [V]			
		24	60	110	220
		Max. switching current [A]			
AC	Resistive load	15	15	15	15
AC	Inductive load, cos φ ≈ 0.7	4	2.5	1.5	0.9
AC	Inductive load, spark quenching with RC-link	6	4	2.5	1.5
DC	Resistive load	2	0.9	0.45	0.2
DC	Inductive load, L/R ≈ 10 ms	1	0.3	0.09	0.02
DC	Inductive load, spark quenching with diode	1.5	0.7	0.35	0.15

Reference number of switchings: 60/min

Reference temperature + 30 °C
(with a reference temperature of + 70 °C, I_{max} corresponds to 50% of the tabulated values only).

Contact-life appr. 1 x 10^6 switching cycles at max. current (at 50% of max. current, contact life is approx. 3 times as long).

Mechanical life approx. 5 x 10^6 switching cycles.

For non-aggressive atmosphere, which in particular does not contain any sulphur, the following limits are valid:

Microswitch with standard silver contacts:
U_{min} approx. 8 ... 12 V, I_{min} approx. 10 mA,
Maximum values according to table above

Microswitch with gold-plated contacts:
(optionally available):
V_{min} and I_{min}: No lower limit
Recommented upper limit:
V_{max} approx. 48 V, I_{max} approx. 20 mA;
Higher values are permissible. In such case, however, silver spring contacts will do.

Creepage and air paths correspond to Insulation Group B according to VDE Reg. 0110 (except contact clearance of microswitch).

Spark quenching (direct current):

1. Diode in parallel to inductive load
   Make sure polarity is correct when making connections.

   Dimensioning of quenching diode (rectifier):
   Rated voltage of diode $V_D \geq 1.4 \times V_{Term.}$
   Rated current of diode $I_{Rated} \geq I_{Load}$

   Choose quick switching diode
   (recovery trr ≤ 200 ns)

2. RC-link in parallel to load (or in parallel to switching contact).
   Suited for direct and alternating current.

   Ratings:
   R [Ω] ≈ 0.2 x R_{Load} [Ω]
   C [µF] ≈ I_{Load} [A]