## Smart ‘Press

## PST... and PST...-R ELECTRONIC PRESSURE SWITCHES




#### Abstract

APPLICATION Honeywell FEMA's PST and PST...-R series Electronic Pressure Switches require adjustment (configuration and parameterization) in only two modes (the basic mode and the expert mode) and are suitable for an extremely wide range of applications, including the precision-adjustment and monitoring of system pressures in the field of plant construction, fluidics, process technology, and pneumatics, as well as in the monitoring and control of pumps and compressors. Due to their monitored sensors with a standardized warning output, these devices are suitable for use in manufacturing lines in the automotive industry as well as in the area of machine tool construction. These switches provide sufficient accuracy ( $0.5 \%$ of final value) for measurement monitoring in many laboratory applications.


## FEATURES

| Housing and back | polybutylene terephtalate (PBT) |
| :--- | :--- |
| Max. ambient temp. | $-20 \ldots+60^{\circ} \mathrm{C}$ |
| Storage temperature | $-35 \ldots+80^{\circ} \mathrm{C}$ |
| Temperature, medium | $-20 \ldots+100^{\circ} \mathrm{C}$ |
| Relative air humidity | $0 \ldots . .95 \%$, non-condensing |
| Accuracy, total | $0.5 \%$ of final value |
| Medium temp. drift | $0.3 \%$ per $10 \mathrm{~K}(0.5 \%$ per 10 K <br> in case of $250 / 400 / 600 \mathrm{mbar})$ |
| Total weight | 380 grams |

Parts in contact with medium

| High-pressure versions | $1.4571+1.4542$ |
| :--- | :--- |
| Low-pressure / flush | $1.4571+1.4435$ |
| Process connection |  |
| Manometer connection | G1/2" external thread |
| Flush connection | G3/4" external thread |
| Electrical connection |  |
| PST series | 5-prong M12 plug, A-coded as per |
|  | DIN IEC 60947-5-2 |
| PST...-R series | Extra 3-prong M12 plug |
| Protection class | II as per EN 60335-1 |
| Protection type | IP65 as per EN 60529 |
| Climate class | C as per DIN IEC 60654 |
| Power supply | 15...36 Vdc, max. 100 mA |
| EMC | compatible as per EN61326/A1 |

Switch outputs (all versions)
Open-Collector outputs Two; configurable as high-side/ low-side or as push-pull switches, max. load: $250 \mathrm{~mA} / 15$... 36 Vdc
Reaction time 30 ms
Switching difference (SP and RP) configurable
Relay outputs (PST...-R series)
Contact type 1 switch-over contact
Min. electrical lifetime 250,000 switching cycles
Switching performance, gold contacts ( $\mathrm{AgSnO}_{2}+\mathrm{Au}$ )
AC1 (resistive) $\quad 1.5 \mathrm{VA}(24 \mathrm{Vdc} / 60 \mathrm{~mA}, 230 \mathrm{Vac} /$
6.5 mA )

AC15 (inductive) unsuitable
Max. switch-on current 60 mA for $<5 \mathrm{~ms}$
Min. switching perf. $\quad 50 \mathrm{~mW}$ (either $>5 \mathrm{~V}$ or $>2 \mathrm{~mA}$ )
Switching performance, silver contacts ( $\mathrm{AgSnO}_{2}$ )

| AC1 (resistive) | $690 \mathrm{VA}(230 \mathrm{Vac} / 3 \mathrm{~A})$ |
| :--- | :--- |
| AC15 (inductive) | $230 \mathrm{VA}(230 \mathrm{Vac} / 1 \mathrm{~A})$ |

Max. switch-on current 30 A for $<5 \mathrm{~ms}$
Min. switching perf. $\quad 500 \mathrm{~mW}$ (> 12 V or $>10 \mathrm{~mA}$ )
Diagnostic output
Output configuration
warning output (plug 2),
max. $20 \mathrm{~mA}, 15 . . .36 \mathrm{Vdc}$
Transmitter output (analog output)
Voltage / current
$0 . . .10 \mathrm{~V}$ and $4 \ldots . .20 \mathrm{~mA}$, configurable in expert mode
Transient response

## VARIANTS

The electronic pressure switches are available in two variants, easily distinguishable by the number of M12 plugs present on the rear side.

## PST... Series

The devices of this series provide both switching functionality and transmitting functionality.
plug 2:
power supply,


Fig. 1. PST... Series, rear view of housing

## PST...-R Series

Like PST... Series devices, the devices of this series provide switching and transmitting functionality, but also relaying functionality.


Fig. 2. PST...-R Series, rear view of housing

## FUNCTION

The PST and PST...R Electronic Pressure Switches are screwed directly into the pressure line or the boiler's connection nozzle. When monitoring gaseous media and low-viscosity liquids, G1/2" standard manometer can be used. In the case of high-viscosity and roiled liquids, G3/4" (flush) process connections must be used.

The LCD display screen indicates the pressure as a 4-digit digital value and as an analog value (bar graph).

Two LED's provide information on the switching status of the outputs and on the alarm status.

The device is configured and parameterized using the large rotary/push button. The user can move from screen to screen and enter values and/or change configurations by rotating the button. Values and configurations are confirmed and/or stored by pressing this button.

Parameterization and configuration are performed in only two modes (the basic mode and the expert mode).

## Basic Mode (Parameterization)

- Outputs 1 and 2: Adjustment of the switch-points (SP) and reverse switch-points (RP).
- Adjustment of the lower (ZERO) and upper (FSO = "full-scale output") reference values for limiting the analog output signal to a defined pressure range.
- Setting of a filter value in a range of $0 . . .95 \%$ (ATT).
- When locked, can be unlocked by entering a CODE.


## Expert Mode (Configuration)

Output 1 (OUT1)

- Configurable as a maximum or minimum monitor.
- Configurable as a window monitor.
- Configurable as normally-open or normally-closed.
- Configurable as low-side/high-side switch or as pushpull switch.


## Output 2 (OUT2)

- Configurable as a maximum or minimum monitor.
- Configurable as a window monitor.
- Configurable as normally-open or normally-closed.
- Configurable as low-side/high-side switch or as pushpull switch.
- Configurable as a warning output (max. 250 mA ).


## Analog Output (AOUT)

- Configurable as a $0 . . .10 \mathrm{~V} / 10 \ldots 0 \mathrm{~V}$ or $4 \ldots 20 \mathrm{~mA} /$ 20... 4 mA output (default setting: $0 . . .10 \mathrm{~V}$ )


## Additional Configuration

- Relay output (REL) configurable to be coupled with OUT1, OUT2, or the warning output.
- Selection of the pressure units (bar, Pa , or psi) in the UNIT display.
- Data restorable using the REST command.
- Selection of a 4-digit locking code (0001 to 9999) in the CODE display ( $0000=$ no code $)$.
- Simulation mode:
- Using the rotary/push button, the pressure can be simulated over the entire range ("SIM1" shown in display).
- The outputs can switch alternately ("SIM2" shown in display) in order to test the installation's reaction time in the range of from 4 times per second to once every 16 seconds (corresponding to a range of $0 . . .100 \%$ ).
- The LCD display's backlighting can be switched from "on continuously" ("LCD+" shown in display) to "turned off when rotary/push button not operated for 30 sec " ("LCD-" shown in display).
- Electronic drag indicator (represented in the LCD display by a dotted arrow) for indicating the max./min. pressure. After pressing the rotary/push button, the user can (in the EDIT mode) read off the elapsed time (in hours; resolution: 0.01 h ) between the event and the present time.


## PROCESS CONNECTIONS

The device is connected to the pressure-side via a G1/2" standard manometer threaded connection or a G3/4" flush process connection (see fig. below). The geometry of the G1/2" and G3/4" connections conforms to DIN EN 837.


standard: SW27
(flush: SW32)

## PRODUCT IDENTIFICATION SYSTEM

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PST = Pressure Switch + Transmitter
PST...-R = Pressure Switch + Transmitter + Relay
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## PRESSURE RANGES

Table 1. Pressure ranges, connection, and equipment of models

| pressure range (bar) | type of pressure | bursting pressure (bar) | max. pressure (bar) | temperature drift (\%/10 K) | process connection | equipment |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | switch and transmitter | switch, transmitter, and relay |
| -1...+1 | relative | $\geq 10$ | 6 | 0.3 | G1/2" | PSTV01RG12S | PSTV01RG12S-R |
| 0... 0.25 | relative | $\geq 10$ | 1 | 0.5* | G1/2" | PSTM250RG12S | PSTM250RG12S-R |
| 0...0.4 | relative | $\geq 10$ | 2 | 0.5* | G1/2" | PSTM400RG12S | PSTM400RG12S-R |
| 0...0.6 | relative | $\geq 10$ | 2 | 0.5* | G1/2" | PSTM600RG12S | PSTM600RG12S-R |
| 0... 1 | relative | $\geq 10$ | 6 | 0.3 | G1/2" | PST001RG12S | PST001RG12S-R |
| 0...1.6 | relative | $\geq 10$ | 6 | 0.3 | G1/2" | PST002RG12S | PST002RG12S-R |
| 0... 4 | relative | $\geq 20$ | 12 | 0.3 | G1/2" | PST004RG12S | PST004RG12S-R |
| 0... 10 | relative | $\geq 50$ | 30 | 0.3 | G1/2" | PST010RG12S | PST010RG12S-R |
| 0... 25 | relative | $\geq 125$ | 75 | 0.3 | G1/2" | PST025RG12S | PST025RG12S-R |
| 0...60 | relative | $\geq 300$ | 180 | 0.3 | G1/2" | PST060RG12S | PST060RG12S-R |
| 0... 100 | relative | $\geq 500$ | 300 | 0.3 | G1/2" | PST100RG12S | PST100RG12S-R |
| 0... 250 | relative | $\geq 1600$ | 500 | 0.3 | G1/2" | PST250RG12S | PST250RG12S-R |
| 0... 600 | relative | $\geq 1800$ | 1000 | 0.3 | G1/2" | PST600RG12S | PST600RG12S-R |
| -1...+1 | relative | $\geq 10$ | 6 | 0.3 | G3/4" | PSTV01RG34F | PSTV01RG34F-R |
| 0...0.25 | relative | $\geq 10$ | 1 | 0.5* | G3/4" | PSTM250RG34F | PSTM250RG34F-R |
| 0...0.4 | relative | $\geq 10$ | 2 | 0.5* | G3/4" | PSTM400RG34F | PSTM400RG34F-R |
| 0...0.6 | relative | $\geq 10$ | 2 | 0.5* | G3/4" | PSTM600RG34F | PSTM600RG34F-R |
| 0... 1 | relative | $\geq 10$ | 6 | 0.3 | G3/4" | PST001RG34F | PST001RG34F-R |
| 0...1.6 | relative | $\geq 10$ | 6 | 0.3 | G3/4" | PST002RG34F | PST002RG34F-R |
| 0... 4 | relative | $\geq 20$ | 12 | 0.3 | G3/4" | PST004RG34F | PST004RG34F-R |
| 0... 10 | relative | $\geq 50$ | 30 | 0.3 | G3/4" | PST010RG34F | PST010RG34F-R |
| 0... 25 | relative | $\geq 125$ | 75 | 0.3 | G3/4" | PST025RG34F | PST025RG34F-R |
| 0... 2 | absolute | $\geq 10$ | 6 | 0.3 | G1/2" | PST002AG12S | PST002AG12S-R |
| 0... 10 | absolute | $\geq 50$ | 30 | 0.3 | G1/2" | PST010AG12S | PST010AG12S-R |
| 0... 2 | absolute | $\geq 10$ | 6 | 0.3 | G3/4" | PST002AG34F | PST002AG34F-R |
| 0... 10 | absolute | $\geq 50$ | 30 | 0.3 | G3/4" | PST010AG34F | PST010AG34F-R |

NOTE*: Due to their design, depending upon their installation orientation, the weight of the diaphragm and of the filling medium in the sensors of the PSTM... series can have an effect on measurement values of up to $0.5 \%$ FS. The devices are all calibrated in the vertical position; in other orientations, deviations in measurement values are therefore possible. For this reason, vertical installation (i.e. with the device positioned vertically above the connection pipe) is to be preferred. In the event that devices of the PSTM... series are installed in a horizontal position, they can be zeroed using the integrated zeroing function ("SETO" shown in the display) prior to initial operation.

OVERVIEW OF ADJUSTABLE PARAMETERS

| activity / situation | LCD display shows |  | parameters adjustable in |  |
| :---: | :---: | :---: | :---: | :---: |
|  | symbols | digital values / text | basic mode | expert mode |
| Current Pressure Is Displayed ${ }^{1}$ |  |  |  |  |
| current pressure |  | digital value | - | - |
| SP [RP] of OUT1 | OUT1 | - | - | - |
| SP [RP] of OUT2 | OUT2 | - | - | - |
| AOUT (pressure betw. ZERO \& FSO) | AOUT | - | - | - |
| pressure is rising | , | - | - | - |
| pressure is dropping | 4 | - | - | - |
| warning | WARN | digital value | NO | NO |
| Parameterizing Output 1 [Output 2] |  |  |  |  |
| SP | 【, OUT1 [OUT2], SP | digital value | YES | NO |
| RP | I, OUT1 [OUT2], RP | digital value | YES | NO |
| first limit of window (WIN) | 【, OUT1 [OUT2], SP | digital value | YES | NO |
| second limit of window (WIN) | I, OUT1 [OUT2], RP | digital value | YES | NO |
| Configuring Output 1 [Output 2] |  |  |  |  |
| max. pressure monitor (SP>RP) | EXPERT, SP, RP, II\\| | OUT1 [OUT2] | NO | YES |
| min. pressure monitor ( $\mathrm{SP}<\mathrm{RP}$ ) | EXPERT, SP, RP, 4\\|! | OUT1 [OUT2] | NO | YES |
| window monitor (WIN) | EXPERT, WIN | OUT1 [OUT2] | NO | YES |
| output 2 as WARN | EXPERT, WARN | OUT2 | NO | YES |
| N-C low-side output 1 [2], OC ${ }^{2}$ | EXPERT, $\sim$ r, ZERO | FCT1 [FCT2] | NO | YES |
| N-O low-side output 1 [2], OC ${ }^{2}$ | EXPERT, - _ ZERO | FCT1 [FCT2] | NO | YES |
| N-C high-side output 1 [2], $\mathrm{OC}^{2}$ | EXPERT, $\sim$-, FSO | FCT1 [FCT2] | NO | YES |
| N -O high-side output 1 [2], $\mathrm{OC}^{2}$ | EXPERT, __, FSO | FCT1 [FCT2] | NO | YES |
| output 1 [2] as "push-pull" | EXPERT, - , ZERO, FSO | FCT1 [FCT2] | NO | YES |
| output 1 [2] as inverted "push-pull" | EXPERT, $\sim$, ZERO, FSO | FCT1 [FCT2] | NO | YES |
| Parameterizing the Analog Output |  |  |  |  |
| first limit (ZERO) of range | I, AOUT, ZERO | digital value | YES | NO |
| second limit (FSO) of range | I, AOUT, FSO | digital value | YES | NO |
| Configuring the Analog Output |  |  |  |  |
| $0 . .10 \mathrm{~V}$ voltage-controlled output | EXPERT, AOUT | FCTV | NO | YES |
| 10... 0 V voltage-controlled output | EXPERT, AOUT, INV $\triangle$ | FCTV | NO | YES |
| 4... 20 mA current-control output | EXPERT, AOUT | FCTA | NO | YES |
| 20... 4 mA current-control output | EXPERT, AOUT, INV $\triangle$ | FCTA | NO | YES |
| Configuring the Relay |  |  |  |  |
| relay coupled with output 1 | EXPERT, OUT1 | REL | NO | YES |
| relay coupled with output 2 | EXPERT, OUT2 | REL | NO | YES |
| relay configured as alarm output | EXPERT, WARN | REL | NO | YES |
| Configuring Unit |  |  |  |  |
| unit | EXPERT, Pa / bar / psi | UNIT | NO | YES |
| Parameterizing Filter |  |  |  |  |
| attenuation | I, ATT, \% | digital value or OFF | YES | NO |
| Locking / Unlocking Device Using a Code |  |  |  |  |
| unlocked (code = 0000) | - | EXP | YES | NO |
| locked (code $=0000$ ) | - | CODE, digital value | YES | NO |
| Changing Code |  |  |  |  |
| device is locked | EXPERT | LOCK | NO | YES |
| device is unlocked | EXPERT | CODE | NO | YES |
| ${ }^{1}$ The same symbols appearing in the expert mode are also visible in the user mode, where they indicate the current configuration of the given <br>  ${ }^{2}$ Open-Collector |  |  |  |  |

## OVERVIEW OF ADJUSTABLE PARAMETERS (CONTINUED)

| activity / situation | LCD display shows |  | parameters adjustable in |  |
| :---: | :---: | :---: | :---: | :---: |
|  | symbols | digital values / text | basic mode | expert mode |
| Locking the expert mode separately (just after switching-on the device, press the rotary/push button until "V..." appears in the display) |  |  |  |  |
| expert mode locked | EXPERT, EDIT | EXPL | NO | YES |
| expert mode unlocked | EXPERT, EDIT | EXPN | NO | YES |
| Resetting the display lighting |  |  |  |  |
| on continuously | EXPERT | LED+ | NO | YES |
| turned off | EXPERT | LED- | NO | YES |
| Electronic max./min. indicator |  |  |  |  |
| pressure exceeds fixed value | IIII, pressure unit (Pa / bar / psi) | digital value | YES | NO |
| pressure exceeds fixed duration | IIII, EDIT, h | digital value or NAVL | YES | NO |
| pressure drops below fixed value | 4III, pressure unit (Pa / bar / psi) | digital value | YES | NO |
| pressure drops below fixed duration | 4III, EDIT, h | digital value or NAVL | YES | NO |
| storage reset | 4III, III), EDIT | RSET | YES | NO |
| Zeroing sensor (just after switching-on the device, press the rotary/push button until "V..." appears in the display) |  |  |  |  |
| selection of zeroing function | EXPERT | SETO | NO | YES |
| zeroing | EXPERT, EDIT, pressure unit, I | digital value | NO | YES |
| Simulation mode |  |  |  |  |
| configure simulation mode | EXPERT, EDIT | SIM- / SIM1 / SIM2 | NO | YES |
| execute pressure simulation SIM1 | MIIIIIIIIIIIIIIIII, EDIT | digital value, SIM1 | YES | NO |
| execute switch simulation SIM2 | I, \% | digital value, SIM2 | YES | NO |

## Honeywell GmbH

Fema Controls
P.O. Box 1254

71099 Schönaich, Germany
phone: (49) 7031-637-02
fax: (49) 7031-637-850
http:/honeywell.de/fema
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