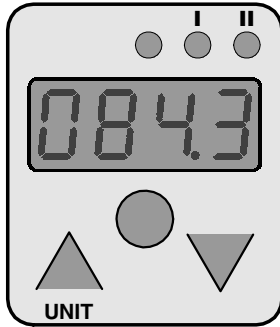


Operating manual Pressure switch



I ● ● II	LED's	Switch status indication I = switch output 1 II = Switch output 2 (also error output)
BBBB	4-position digital display with variable decimal point	Display of system pressure in MPa, psi, bar; display of parameters
▲	Arrow key up	Arrow key to look back in menu or to set a higher parameter
▼	Arrow key down	Arrow key to look forward in menu or to set a smaller parameter value
●	Enter / OK	Enter key to select a parameter value or to confirm a parameter value
UNIT		Display of the unit

Note

The statements made in this operating manual are intended for users with specialised knowledge.

It is essential that the user checks the statements about the chosen product for suitability for the functions required. Because of the various tasks and working processes in any system, the user must check and make sure that all the demands regarding the function and safety of the system are satisfied by the features of the product.

Subject to alteration

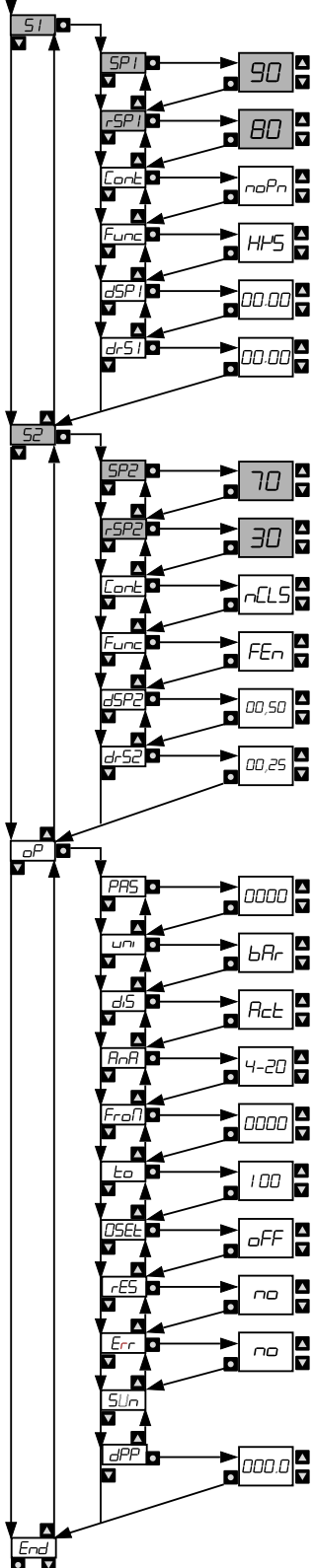
89.7

Press an arrow key \blacktriangle or \blacktriangledown and keep it depressed.
 Whilst holding an arrow key depressed,
 press the Enter key \blacksquare .
 The letters *Prog* appear.

switch output 1
S1

switch output 2
S2

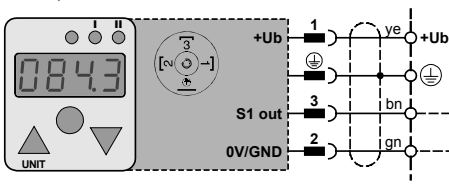
options programme
oP



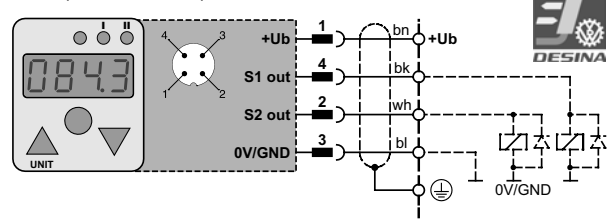
- S1** S1 Switch output 1
- SP1** Upper switching point after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 90
- rSP1** Reverse switching point after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 80
- Cont** Switchoutput as *rCLS* opener / *noPn* closer after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown noPn
- Func** Switching function *Hys* Hysteresis / *Fen* window after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown Hys
- dSP1** Delaytime for upper switching point *SP1* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 00.00
- drS1** Delaytime for reverse switching point *rSP1* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 00.00
- S2** S2 Switch output 2
- SP2** Upper switching point after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 70
- rSP2** Reverse switching point after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 30
- Cont** Switchoutput as *rCLS* opener / *noPn* closer after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown rCLS
- Func** Switching function *Hys* Hysteresis / *Fen* window after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown Fen
- dSP2** Delaytime for upper switching point *SP2* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 00.50
- drS2** Delaytime for reverse switching point *rSP2* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 00.25
- oP**
- Pass** Password: 0000 = no Password after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 0000
- uni** Setting of units: *bar* / *PSi* / *NPA* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown bar
- dS** value to Display: *Actual* / *Min* / *Max* / *SP1* / *SP2* / *oFF* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown Act
- AnA** Analogue output: 0-20mA / 4-20mA after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 4-20
- FroN** calibration of starting value for analogue output after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 0000
- to** calibration of end value for analogue output after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 100
- OSet** Zeroing adjustment: *oFF* / *HES* / *no* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown oFF
- rES** Clearing min/max value memory *HES* / *no* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown no
- Err** Switch 2 as error output *HES* / *no* after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown no
- SUn** Software version
- dPP** decimal point in display after pressing Enter \blacksquare adjust values with \blacktriangle / \blacktriangledown 000.0
- End**

Example:	Factory settings:
90 bar	nominal instrument pressure example 400 bar
80 bar	nominal instrument pressure -10% example 400 bar -10%
noPn closer	noPn closer
Hysteresis (Standardswitch)	Hysteresis (Standardswitch)
00.00 sec no damping	00.05 sec 50ms damping
00.00 sec no damping	00.05 sec 50ms damping
70 bar	nominal instrument pressure example 400 bar
30 bar	nominal instrument pressure -10% example 400 bar -10%
rCLS opener	noPn closer
Fen window	Hysteresis (Standardswitch)
00.5 sec 500ms damping	00.05 sec 50ms damping
00.25 sec 250ms damping	00.05 sec 50ms damping
no Password	no Password
bar display	bar display
Actual pressure (like pressure gauge)	Actual pressure (like pressure gauge)
4-20mA	4-20mA
0bar = 4mA	0bar = 4mA
100bar = 20mA	nominal instrument pressure = 20mA
no zeroing adjustment	no zeroing adjustment
no	no
no	no
1 decimal point	depends on nominal instrument pressure

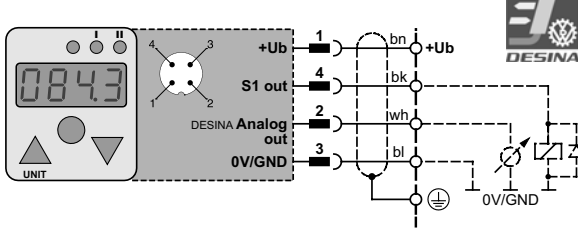
1 output; DIN43650



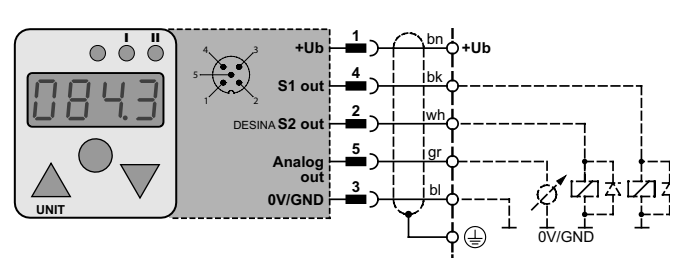
2 outputs; M12 4-pol.



1 output; analog output; M12 4-pol.



2 outputs; analog output; M12 5-pol.



Parameters shown in digital display

Settings of switch outputs in menu

51 (S1 = output 1) or 52 (S2 = output 2)

<i>PR5</i>	This is dedicated to a password. Entry into the programming mode can be secured only when the correct figures have been entered
<i>S1</i> <i>S2</i>	Menu for programming the switch outputs: (see point 3) <i>S1</i> = Switch output 1 <i>S2</i> = Switch output 2 (Menu is not active if S2 is being used as an error output)
<i>SP1</i> <i>SP2</i>	Switching point (SP): upper limiting value/pressure, at which the switch output changes its status (see point 3) <i>SP1</i> = Switch output 1; input as pressure value (e.g. 400 bar) <i>SP2</i> = Switch output 2; input as pressure value (e.g. 430 bar)
<i>rSP1</i> <i>rSP2</i>	Reverse switching point (<i>rSP</i>): lower limiting value/pressure at which switch output changes its status (see point 3) <i>rSP1</i> = Reverse switching point (<i>rSP1</i>) of switch output 1; input as pressure value (e.g. 390 bar) <i>rSP2</i> = Reverse switching point (<i>rSP2</i>) of switch output 2; input as pressure value (e.g. 420 bar) The reverse switching point is always smaller than its respective switching point. If the reverse switching point is set higher than the switching point, the reverse switching point will be set automatically 0.5% of the instrument nominal pressure below the switching point. The warning sign <i>Alt!</i> (attention) will appear, which can be cleared with Enter
<i>cont</i>	Switch output as <i>noPn</i> = closer <i>rCLS</i> = opener
<i>Func</i>	Selection of switching functions: (see point 3) <i>HPSL</i> = Hysteresisfunction <i>FEn</i> = Window function
<i>dSP1</i> <i>drS1</i> <i>dSP2</i> <i>drS2</i>	Delay times; input from 0 to 9.99 s. (see point 3) <i>dSP1</i> = delay time switching point output 1 <i>drS1</i> = delay time reverse switching point output 1 <i>dSP2</i> = delay time switching point output 2 <i>drS2</i> = delay time reverse switching point output 2

) Enter

Settings for options programme \square^P

\square^P	Options programme
<i>PR5</i>	Password input 0000 = no password Example password 1234 = 1234
<i>uni</i>	Setting of units: <i>bAr</i> = bar <i>MPa</i> = MPa <i>PSi</i> = psi
<i>d5</i>	Display: Value which will be shown on the digital display in run mode. <i>Act</i> = Actual system pressure <i>mn</i> = Minimum system pressure; (pressure troughs) <i>MA</i> = Maximum system pressure; (pressure peaks) <i>SP1</i> = Switch point 1 <i>SP2</i> = Switch point 2 <i>OFF</i> = off indication
<i>AnR</i>	Setting of analogue output (see point 4) <i>0-20</i> = 0-20 mA <i>4-20</i> = 4-20 mA
<i>FraD</i>	Calibration of starting value (0 or 4 mA) for the analogue output (see point 5). Settable from 0 to nominal instrument pressure -5%. Example for <i>AnR</i> = 4-20 : 0000 = at 0 bar the analogue output yields 4 mA. The starting value is always smaller than the end value. If the starting value is set greater than the end value, then the starting value will be automatically set 5% of the nominal instrument pressure below that of the end value. The warning sign <i>Alt!</i> will appear, which can be cleared with the enter sign
<i>to</i>	Calibration of end value (20mA) for the analogue output (see point 4). Settable from 0 up to nominal instrument pressure. 0010 = at 10 bar the analogue output yields 20 mA.
<i>0SET</i>	Zeroing adjustment: The actual pressure will be stored as a new zero point. For safety reasons this is limited to the range $\pm 5\%$ of the nominal instrument pressure. Application example: a system with a continuous residual pressure, but which should be displayed as 0 bar. <i>OFF</i> = factory calibration <i>HES</i> = undertake zeroing adjustment now <i>no</i> = go back to the menu and do not make any new zeroing adjustments. After a zeroing adjustment, a pressure of up to 20 bar can be displayed as 0 on a 400 bar pressure switch. Before working on a system, it must be ensured that there is no pressure in it.
<i>rES</i>	Clearing the minimum and maximum value memory <i>HES</i> = yes, clear memory now <i>no</i> = no, do not clear memory
<i>Err</i>	Programming switch output 2 as an error output (see point 3) <i>HES</i> = yes <i>no</i> = no
<i>SLn</i>	Indication of software version
<i>dPP</i>	Setting of the decimal point. (The maximum number of decimal points depends on the nominal pressure of the pressure switch) 0000 = no decimal point 000.0 = 1 decimal point 00.00 = 2 decimal points 0.000 = 3 decimal points
<i>End</i>	End of programming mode

) Enter

Error display and precautionary hints

<i>Alt1</i>	The set value is lower than the other respective parameters. When Enter is activated, the smaller value is matched up (see menu points <i>SP</i> , <i>rSP</i> and <i>FraD</i> , <i>to</i>)
<i>Alt2</i>	Zero point comparison error!! The value which should be set as the zero point is greater than 5% of the measuring range end value.
<i>Err1</i>	Instrument electronics defective... Please send for repair.
<i>Err2</i>	Instrument nominal pressure/measuring range exceeded by 10%. Please check system pressure.
<i>Err3</i>	Instrument nominal pressure/measuring range exceeded. Error in analogue electronics... Please check system pressure. If error persists, please send the instrument for repair.

) Enter

Installation

Mechanical:



Install and de-install the pressure switch only when there is no pressure present.

Attach the pressure switch to the appropriate process connection. Installation should be undertaken only across flats spanner.

Ensure that the digital display is placed in the best viewing position by using the rotational housing adjustment.

The housing can be attached

- with self-tapping screws into two blind holes at the back of the housing
- with clamps

If it is not sensible or possible to screw the pressure switch in, a diagnostic hose is used for connecting up to the system.

Electrical:



The pressure switch may be installed only by a qualified electrician in accordance with the respective national and international regulations.

Protect the pressure switch from electromagnetic influences and over-voltages.

Optional installation tips which are shown by experience to reduce the influence of interference:

- Use shorter cables
- Avoid short distances between connecting leads and power consuming devices and interference-generating electrical and electronic equipment.
- Use free running diodes

1. General instrument description

By choosing the pressure switch you have acquired a quality product which is outstanding for its high reliability. Pressure is captured by a measuring cell, which is outstanding for its typical zero point stability and long term stability. The following pressures in MPa, bar or psi can be shown on the large 4-position digital display: the actual, lowest or highest memorized pressure and also the set switching points.

The display is easily readable, thanks to the waterproof housing which can be rotated. The self-explanatory menu-driven parameter set-up is achieved with 3 keys. Unauthorised parameter changes can be prevented by means of a password.

Two programmable switching outputs, each independent of the other, and a readily programmable analogue output are available for connection with electrical controls. Each switching output has two pressure switching points with which on and off switching pressures can be readily set (variable hysteresis). Unwanted pressure peaks of short duration or high frequency can be filtered (attenuated) by means of settable delay times.

The switching outputs are switched as opener or closer corresponding to the set switching points, hysteresis or window functions, and indicated on the status display. An apparent function error will be signalled on the digital display and can be further processed in accordance with Desina. The electronics, which are protected against reverse polarity, over-voltage and short circuits are in a fully cast enclosure, and are thereby resistant to moisture and vibrations.

2. Safety notes/ choice of product

The proper functioning in accordance with this operating manual is guaranteed solely when the technical specifications are adhered to.

This applies especially to keeping to the instrument nominal pressure and also to the allowable temperature range.



Operating the selected product outside the specification or disregard for the operating notes can result in serious malfunctioning, and damage to people or property due to the sinking or dropping of suspended loads cannot be ruled out.



The pressure switch should not be exposed continuously to the sun's radiation

- The pressure switch housing and the front film may be cleaned using a moistened cleaning cloth: aggressive cleaning materials should never be used.
- Avoid static and dynamic overload exceeding the overload pressures indicated. Even briefly exceeding the overload pressure can destroy the pressure switch.



For critical applications with strong vibrations or shocks, disconnect mechanically by means of a measuring hose

3. Operating modes

The pressure switch has the following operating modes:

- Run mode (normal working operations)
- Display mode (display of set parameters such as switching points, opener, closer...)
- Programme mode (setting of parameters such as switching points, opener, closer...)
- Reset mode (resetting to standard values)

Switching on

When the supply voltage is switched on, the pressure switch carries out a self-test.

- The display and the switching point indication light up.
- The instrument nominal pressure is displayed.

During this time (2secs.) the outputs are not active.


Run mode


After switching on, the pressure switch is in run mode.




The digital display indicates the actual system pressure and the two red LED's signal the actual switch status of the outputs. It carries out its monitoring functions, switches the switch outputs in accordance with the set parameters and converts the actual system pressure into an analogue signal.

Display mode

In the display mode the control parameters can be shown but cannot be changed.

-  To ensure trouble-free operation, the pressure switch remains internally in the run mode. If no key has been pressed for 30 seconds, the pressure switch changes back automatically to run mode.


Display mode activation is by the Enter key .
The letters *dSP* appear.

- A short touch on an arrow key  or  scrolls through the menu points.
- A short touch on the Enter key  shows the relevant parameters.

- ① A password is shown as - - - - .




Programming mode

In the programming mode the parameters are changed and stored thereafter continuously. An electrical supply is not necessary for the retention of stored data (storage in EEPROM).

-  To ensure trouble-free operation, the pressure switch remains internally in the run mode. If no key has been pressed for 30 seconds, the pressure switch changes back automatically to run mode.




Activation of the programming mode

To exclude the unintentional change of programmed parameters, the programming mode can be activated only by the following key combinations:







- Press an arrow key  or  and keep it depressed. Whilst holding an arrow key depressed, press the Enter key .
The letters *Prog* appear.


Password protection

To prevent any unauthorised change of parameters, the programming mode can be protected by an optional password.



- When a password has been programmed in, *PAS* appears. With the arrow key  or  the password is entered and confirmed with Enter . After this the pressure switch can be programmed.
- If no password has been set up (password= 0000), the pressure switch can be immediately programmed.

Programming




- Press an arrow key  or  to scroll through the menu points.
- Pressing Enter  shows the relevant parameters.
- Pressing the arrow keys  or  changes the selected parameters. Holding the arrow key depressed achieves fast and easy input and the values of the parameters to be set can be changed faster.
- A changed value is confirmed with the Enter key  and the next menu point is then displayed.

-  The pressure switch carries on with its monitoring functions to the existing parameters until the respective change is concluded.

Reset

When the supply voltage is switched on the two arrow keys   are pressed simultaneously.

At this point *rSt* appears.

When both arrow keys  and  are kept depressed and the Enter key  activated, the pressure switch resets all the settable parameters back to the factory settings.

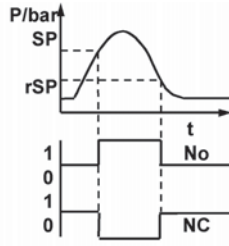
4. Switching functions

Hysteresis function:

If the system pressure fluctuates around the nominal value, the hysteresis keeps the switch status of the outputs stable. When the system pressure is rising, the output switches when it reaches the respective switching point (SP); if the pressure falls again, the output switches back only if the reverse switching point (rSP) is reached.

(See menu point F_{unC} , SP , rSP)

Application example: loading an accumulator. The shut-off valve loads up to 80 bar and then shuts off. When 70 bar is reached again, it switches on once more.

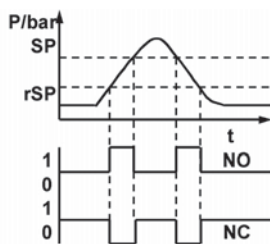
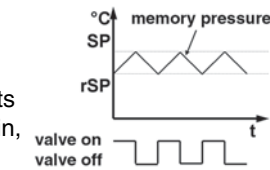


Window function

The window function allows the monitoring of a defined range.


If the system pressure is between the switching point (SP) and the reverse switching point (rSP), the output is activated.

(See menu point F_{unC} , SP , rSP).



Error function

Switch output 2 can be used optionally as an error output to display pressure switch function errors. As an error output it is normally closed, and in case of errors ($Err1$, $Err2$, $Err3$) it is open. At the same time LED II lights up. The display and the error output remain active until the error is cleared. (See menu point Err)

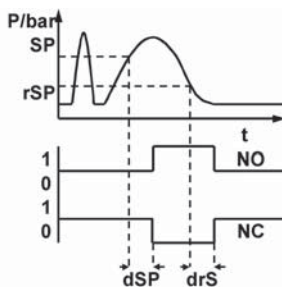
 It conforms to DESINA when used with a 4-pole M12x1 connecting plug

Delay times (0 to 9,99 secs.)

By this means unwanted pressure peaks of short duration or high frequency can be filtered out.

The pressure must remain for at least this time to enable the switch to operate. The switch output does not immediately change its status when it reaches the switching event, but only after the delay time has elapsed. If the switching event no longer pertains when the delay time has elapsed, the switch output does not change.

(See menu points dSP and drS)



5. Analogue Output

The pressure switch has two standardised output signals from 0-20mA or 4-20mA. In addition, it is possible to calibrate the starting and end values.

This is a prerequisite for

- compatibility with existing systems
- matching with systems having pressure peaks

Where there is a danger of excessively high pressure peaks which overstep the indicated overload pressure, use a pressure switch with a higher instrument pressure and match the analogue output with your application.

Examples:

Nominal pressure: 100 bar.

Pressure peaks $P(\max)$: 600 bar.

An output signal from 4-20 mA for 0 to 90 bar is required.

Resultant setting values for e.g.:

$R_{nA} = 4-20$ Analogue output 4-20 mA
(see menu point R_{nA})

$F_{roA} = 0000$ 0 bar = 4 mA
(see menu point F_{roA})

$t_o = 90$ 90 bar = 20 mA
(see menu point t_o)