User's Guide

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PSW32 SERIES

ELECTRONIC PRESSURE SWITCH FOR HYDRAULIC APPLICATIONS

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ELECTRONIC PRESSURE SWITCH FOR HYDRAULIC APPLICATIONS

PSW32 Series

APPLICATION

IIdeal for Control of Air, Water, Gases, Neutral Mineral Oils and Various Heating Oils

FEATURES

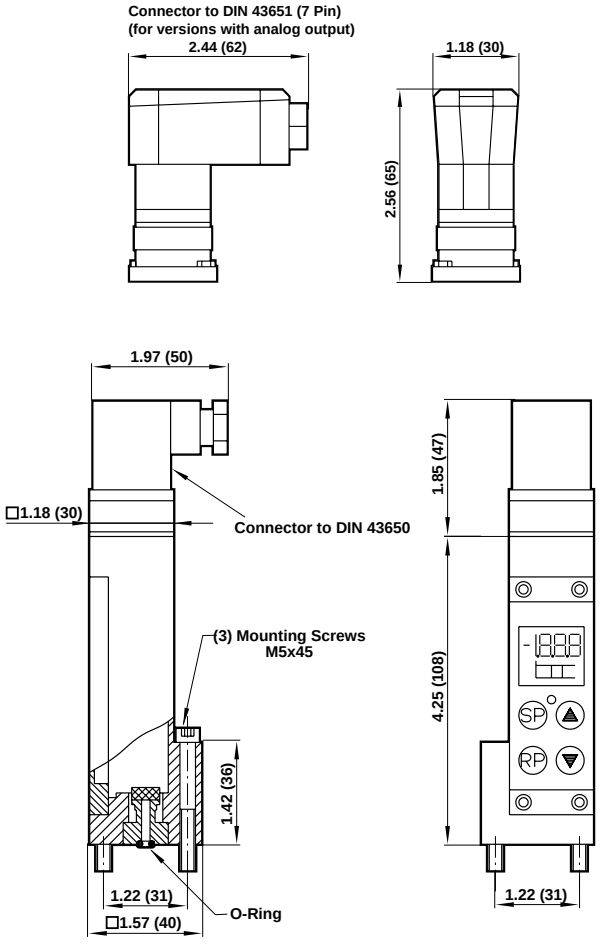
- **Real-time LED Status Display of Pressure**
- **Adjustable Hysteresis**
- **Off-line Calibration**
- **Fast, Accurate Response**
- **Extensive Service Life**
- **Analog Output (Optional)**

SPECIFICATIONS

Ports	1/4" NPT
Adjustment Range	0 to 2320 PSI (0 to 160 bar)
Proof / Burst Pressure	See Part Number Identification Table
Temperature Rating	
Ambient	14° to 140° F (-10° to 60° C)
Media	14° to 175° F (-10° to 80° C)
Temperature Sensitivity	
@ Zero Point	Set Point Shifts 0.4% FS/10°C
@ Set Point Pressure	Set Point Shifts 0.3% FS/10°C
Electronics	Pressure Sensor, Microprocessor Evaluation Circuitry and Solid-state Output Driver
Switching / Reset Point	Adjustable between 0 – 100% of FS Value
Linearity	< 0.5% of FS ± 1 digit
Electrical Connector	*Without* Analog Output: DIN 43650 Table A with Removable Cable Plug Adapter *With* Analog Output: DIN 43651, 7 Pin Circular Connector

MATERIALS OF CONSTRUCTION

Housing	Die-Cast Zinc
Sensor	304 Stainless Steel
O-Ring	Viton



All dimensions in inches (mm)

ELECTRICAL PARAMETERS

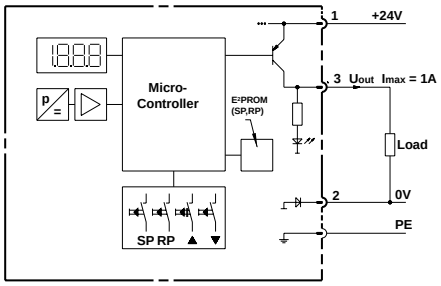
Electrical connection DIN 43650 Table A without analog output
DIN 43651 (7 pin), with analog output

Power supply (polarity safe) 18 to 32V DC

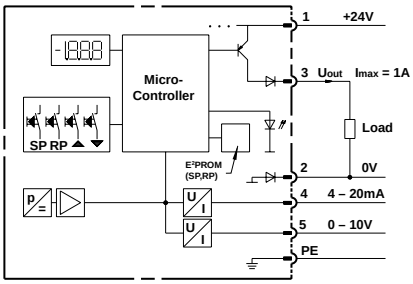
Permissible residual ripple 10% (within 18 to 32V)

Current consumption <50 mA (plus load current)

DIN 43650 **without** analog output



DIN 43651 **with** analog output



SWITCHING OUTPUT

Switching mode Open collector PNP switched to supply (suited for inductive load)

Output voltage Supply voltage minus 1.5V (approx)

Analog output O to l0V and 4 to 20mA

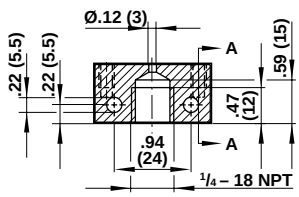
Contact rating I_{max} = 1A (short-circuit proof)

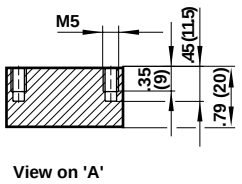
Switching time < 5ms

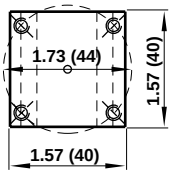
Service life 100 million switching cycles

Switching logic Signal "on" with rising pressure, if SP* > RP**
Signal "on" with falling pressure, if SP < RP

* SP = Switching point **RP = Reset point







Mounting Plates (Included)
1/4" NPT Pressure Port
304 Stainless Steel

All dimensions in inches (mm)

PART NUMBER IDENTIFICATION

PART NUMBER	PRESSURE RANGE PSI	ELECTRICAL CONNECTION	PROOF / BURST PRESSURE – PSI	ANALOG OUTPUT 0-10 VOLT AND 4-20mA
PSW32B	0 – 580 (0 – 40)	DIN 43650	1450/2175 (100/150)	No
PSW32B-A	0 – 580 (0 – 40)	DIN 43651	1450/2175 (100/150)	Yes
PSW32C	0 – 1450 (0 – 100)	DIN 43650	2900/4350 (200/300)	No
PSW32C-A	0 – 1450 (0 – 100)	DIN 43651	2900/4350 (200/300)	Yes
PSW32D	0 – 2320 (0 – 160)	DIN 43650	4350/5800 (300/400)	No
PSW32D-A	0 – 2320 (0 – 160)	DIN 43651	4350/5800 (300/400)	Yes

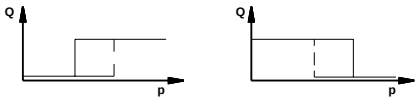
Numbers in parentheses indicate measurement in bar.

Notes: Mounting plates included.
For hydraulic applications with pressure spikes or surges install a pressure snubber.
All pressure switches are shipped with mounting screws, o-ring and mating electrical connector.

Adjusting the Switching Points (SP) and Reset Points (RP)

a) Adjusting the switching point.

Case 1 or Case 2

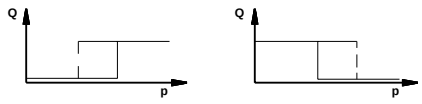


Press and hold the **SP** button. The display will show the previous switching pressure setting, and the dotted bar will flash while the button is pressed down (case 1).

You can now use the cursor keys 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 the **SP** button is released, after which the display will show the current pressure value and the bar will quit flashing.

b) Adjusting the reset point.

Case 3 or Case 4



Press and hold the **RP** button. The display will show the previous reset pressure setting, and the dotted bar will flash while the button is pressed down.

You can now use the cursor keys to adjust the reset point in the same manner 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 "Switching pressure = Reset pressure". When both 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 settings are correct.

c) Setting a buffering time.

In order to prevent brief pressure “spikes” or “surges” from causing undesired switching, a buffering time can be entered. The effect of this is that pressure changes are evaluated only if the pressure signal in question is present for longer than the buffering time. In order to set a buffering time, press the button SP before the power supply is switched on. Release this button again after the power supply has been switched on. The display will then show the buffering time in milliseconds (e.g. 03) or seconds. The cursor buttons ▼, ▲ can be used to set the buffering time to 03, 06, 12, 24 or 50 ms or 0.1, 0.2 or 0.4 seconds. When this has been done, press SP to store the setting.

d) Setting the pressure switch to ambient pressure = 0.

Since ambient pressure varies according to altitude, the user may re-calibrate the zero point to match local conditions.

Press the button **RP** before the power supply is switched on. Release this button again after the power supply has been switched on and the display test has run. The display will then show "OFS". The cursor buttons ▼, ▲ can be used to set the pressure display to 0. When this has been done, press **SP** to store the setting.

e) Hysteresis mode

If it is desired to operate with a fixed hysteresis value instead of the reset point, this value can be selected as desired.

In order to set a hysteresis value, the two buttons **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 has run. The display will then show the operating mode. The cursor buttons ▲,▼ can now be used to change the operating mode until "HYS" appears in the display. When this has been done, press **SP** to store the setting.

The **SP** button can be used to display the switching-point setting, which can be modified by means of the cursor buttons ▲,▼.

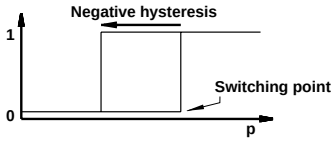
The button **RP** can be used to display the hysteresis setting, which can also be modified by means of the cursor buttons ▲,▼.

Negative hysteresis means: Signal “on” with rising pressure (case 1).

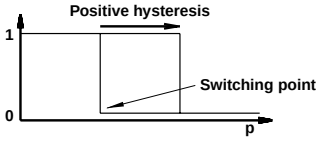
Positive hysteresis means: Signal “on” with falling pressure (case 2).

If the switching point is modified, this will automatically also result in a change in the reset point by a value equal to the hysteresis setting.

Case 1



Case 2



f) Window mode

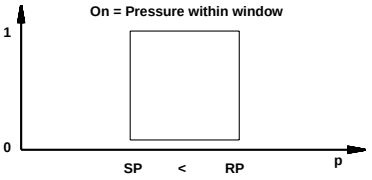
If it is desired to monitor whether the pressure lies within a certain range, a switching window can be created for this purpose. The pressure switch will then indicate cases in which the actual pressure lies above or below this area. In order to set a switching window, the two buttons **SP** and ▼ must 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 has run. The display will then show the operating mode.

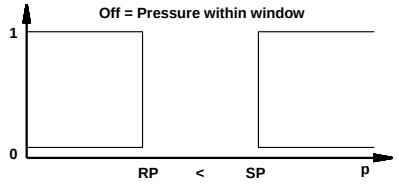
The cursor buttons ▲,▼ can now be used to change the operating mode until "FEn" (standing for "Window") in the display. When this has been done, press **SP** to store the setting. The button **SP** can be used to display the switching-point setting, which can be modified by means of the cursor buttons ▼, ▲.

The distance between the switching point and reset point is 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 preset window (case 1, rising pressure). If the switching point is higher than the reset point, a signal will be output as long as the pressure lies outside the preset window (case 2, rising pressure). In the case of falling pressure, the signal is inverted.

Case 1



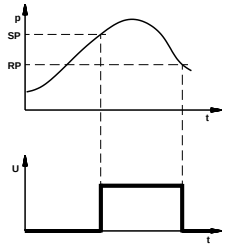
Case 2



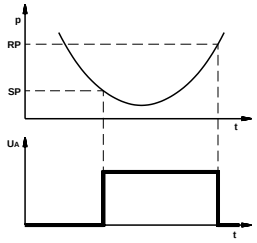
Std = Standard mode, switching and reset points adjustable
HYS = Hysteresis mode, switching point and hysteresis adjustable
FEn = Window mode, switching window adjustable

Switching Characteristic Graphs

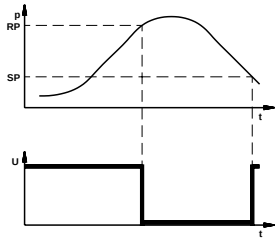
Signal “on” with **rising** pressure
Setting SP* > RP**



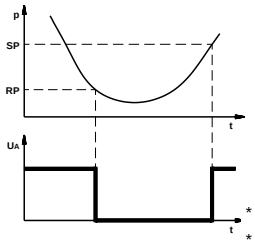
Signal “on” with **falling** pressure
Setting SP < RP



Signal “off” with **rising** pressure
Setting RP > SP



Signal “off” with **falling** pressure
Setting RP < SP

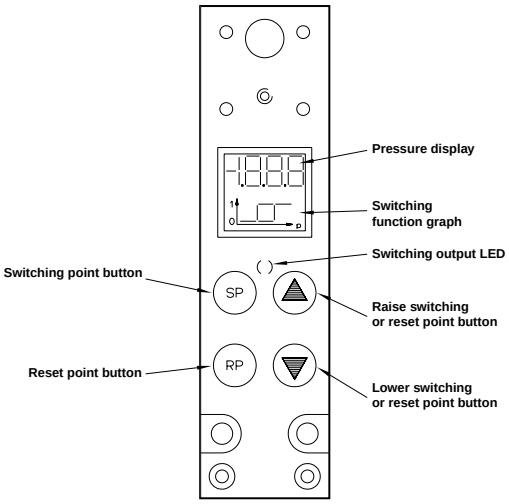


* SP = Switching point
**RP = Reset point

Explanation:

When the switching point (SP) is adjusted **HIGHER** than the reset point (RP), then the switching output will be “normally off”.
When the switching point (SP) is adjusted **LOWER** than the reset point (RP), then the switching output will be “normally on”.

Position of operating elements



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	Initialization error	Checksum of initialization 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)

Display	Meaning	Cause / Remedy
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 held at an open-circuit potential of > 3V, 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 (<17V). 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 (Buffering time)	Setting of filter time constant
		xx = Switching output delay
		xx ∈ {03, 06, 12, 24, 50} in ms and
		xx ∈ {O.1, 0.2, O.4} in s.
OFS	Offset	Request for offset adjustment using ▼ and ▲ buttons
SC.H	Short-circuit high	Short-circuit monitoring activated
U. LO	Voltage low	Voltage monitoring activated
OFF	Off	Short-circuit or voltage monitoring deactivated
Std	Standard mode	Standard mode activated
HYS	Hysteresis mode	Hysteresis mode activated
FEn	Window mode	Window mode activated
U-C	Voltage calibration	Voltage output selected
I-C	Current calibration	Current output selected

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components, which wear, are not warranted, including but not limited to contact points, fuses, and triacs.

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RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS,
please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA.

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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