| SVMtec | Manual | Version | 1.5 |
|---|---|---|---|
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# PSC Multichannel Pressure Scanner – PSC8 / PSC16 / PSC24

PSC8

PSC16

PSC24

## 1. GENERAL DESCRIPTION

The pressure scanners from the PSC series are suitable for simultaneous acquisition of multiple pressure signals. The standard variants PSC8, PSC16 and PSC24 allow the connection of 8, 16 and 24 differential pressures respectively.

The PSC series is a very flexible system and can be customized. Up to 3 different pressure ranges can be realized in one device. The number of reference ports can also be defined by the customer. By default, the reference pressures of all channels are combined on one port. However, it is also possible to group the reference ports or to give each channel its own reference port.

For all interfaces except CAN, data is transmitted as ASCII text in the unit Pascal [Pa]. By means of a simple protocol the transmission rate can be set in the range between 1 and 100Hz (PSC8) or 50Hz (PSC16, PSC24).

A TARA function for automatic deduction of the offset can be triggered either by pressing the TARA button on the back panel or via a software command. The 8-channel version is optionally available with built-in solenoid valves, which allows automatic zeroing of the sensors when pressure is applied.

The pressure scanner is powered via the USB port. For the version with solenoid valves and CAN or LAN interface an external power supply is necessary (7-24VDC, 1A), which is included in delivery.

The USB pressure scanners register themselves in a PC-system as a virtual COM port. Thus, any software that supports the RS232 protocol can be used. The network variant sends the data via TCP-IP. A direct connection can be established via Telnet (port 10001). (Under Windows for example via the program putty.exe). If LabVIEW® (National Instruments) is used, the use of the VISA class is recommended, because it allows access to USB devices as well as to the network devices.

Drivers for LabVIEW® are included in the scope of delivery.

# 2. TECHNICAL DESCRIPTION

## 2.1. PRESSURE RANGES

The following table shows the standard pressure ranges. Other ranges can also be realized on request.

| [1] | p-Min[2] | p-Max[3] | Δp[4] | | Proof[5] | Burst[6] | |
|---|---|---|---|---|---|---|---|
| Bi-direktional | | | | | | | |
| D | -125 | 125 | 0,02 | [Pa] | 25 | 75 | [kPa] |
| D | -250 | 250 | 0,04 | [Pa] | 25 | 57 | [kPa] |
| D | -500 | 500 | 0,07 | [Pa] | 25 | 57 | [kPa] |
| D | -1,25 | 1,25 | 0,0002 | [kPa] | 50 | 57 | [kPa] |
| D | -2,5 | 2,5 | 0,0004 | [kPa] | 50 | 57 | [kPa] |
| D | -5,0 | 5,0 | 0,0007 | [kPa] | 50 | 125 | [kPa] |
| D | -7,5 | 7,5 | 0,001 | [kPa] | 50 | 125 | [kPa] |
| D | -15 | 15 | 0,002 | [kPa] | 50 | 200 | [kPa] |
| D | -25 | 25 | 0,004 | [kPa] | 100 | 100 | [kPa] |
| D | -50 | 50 | 0,008 | [kPa] | 100 | 100 | [kPa] |
| D | -100 | 100 | 0,015 | [kPa] | 300 | 1000 | [kPa] |
| D | -250 | 250 | 0,04 | [kPa] | 720 | 1700 | [kPa] |
| D | -500 | 500 | 0,08 | [kPa] | 1200 | 1700 | [kPa] |
| D | -1000 | 1000 | 0,16 | [kPa] | 1700 | 1700 | [kPa] |
| Uni-directional | | | | | | | |
| D | 0 | 250 | 0,02 | [Pa] | 25 | 75 | [kPa] |
| D | 0 | 500 | 0,04 | [Pa] | 25 | 75 | [kPa] |
| D | 0 | 1,25 | 0,0001 | [kPa] | 50 | 75 | [kPa] |
| D | 0 | 2,5 | 0,0002 | [kPa] | 50 | 75 | [kPa] |
| D | 0 | 5,0 | 0,0004 | [kPa] | 50 | 125 | [kPa] |
| D | 0 | 7,5 | 0,0005 | [kPa] | 50 | 125 | [kPa] |
| D | 0 | 15 | 0,001 | [kPa] | 50 | 200 | [kPa] |
| D | 0 | 25 | 0,002 | [kPa] | 100 | 100 | [kPa] |
| D | 0 | 50 | 0,004 | [kPa] | 100 | 100 | [kPa] |
| D | 0 | 100 | 0,008 | [kPa] | 300 | 1000 | [kPa] |
| D | 0 | 250 | 0,02 | [kPa] | 720 | 1700 | [kPa] |
| D | 0 | 500 | 0,04 | [kPa] | 1200 | 1700 | [kPa] |
| D | 0 | 1000 | 0,08 | [kPa] | 1700 | 1700 | [kPa] |
| Absolute pressure | | | | | | | |
| A | 0 | 34 | 0,003 | [kPa] | 100 | 100 | [kPa] |
| A | 0 | 100 | 0,007 | [kPa] | 200 | 1,0 | [MPa] |
| A | 0 | 200 | 0,013 | [kPa] | 800 | 1,7 | [MPa] |
| A | 0 | 400 | 0,025 | [kPa] | 1,3 | 1,7 | [MPa] |
| A | 60 | 110 | 0,004 | [kPa] | -- | 1,7 | [MPa] |

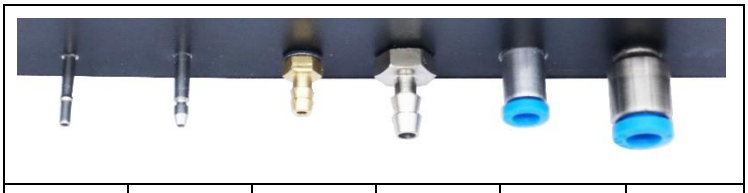
1) D: differential, pressure difference can be applied via 2 ports.
The reference side (min) can also be applied together to one port

A: absolute, measurement of absolute pressure, an open measuring point indicates the actual air pressure, if the pressure is within the measuring range

2) Nominal smallest possible measured value
3) Nominal largest possible measured value
4) Resolution of digitization (rounded)
5) Maximum pressure that does not yet cause damage to the sensor
6) Maximum differential pressure against environment that the internal sensor housing can withstand. At a higher pressure, the housing may crack. However, damage to the sensor occurs when the PROOF pressure is reached.

## 2.2. PRESSURE PORTS

The PSC pressure scanners can be supplied with the pneumatic connections shown below.



| T16 | T20 | T25 | T35 | P20 | P30 |
|---|---|---|---|---|---|

Some ports are not suitable for all pressure ranges. For packaging reasons there are additional restrictions for the PSC24 devices.

| Bez. | DI [mm] | DA [mm] | Schlauchmaterial (empfohlen) | Max. Druck | Geeignet für |
|---|---|---|---|---|---|
| T16 | 1,3 … 1,6 | | Silikon, PE, PVC | 0,1MPa | All versions |
| T20 | 1,5 … 2,0 | | Silikon | 15kPa | All versions |
| T25 | 2,0 … 2,5 | | Silikon | 15kPa | All versions with shared reference |
| T35 | 2,5 … 3,0 | | Silikon | 15kPa | PSC8, PSC16 |
| P20 | | 2,0 | PE, PU, PA | 1MPa | PSC8, PSC16 |
| P30 | | 3,0 | PE, PU, PA | 1MPa | PSC8, PSC16 |

## 2.3. HOUSING

### Frontpanel

The front panels are available in various designs. Both the grouping of the reference pressure ports and the type of ports can be customized.


*24 pressur ports with shared reference*


*24 pressure ports with individual reference ports*


*Customized version with 2 channel groups*


*Customized version with additional high pressure ports*

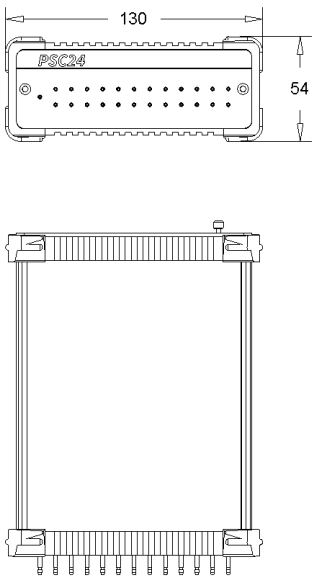
## Backpanel

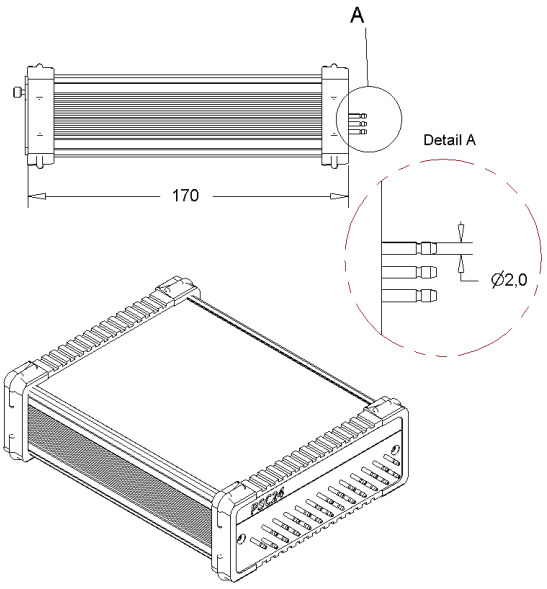
On the back panel are the electrical connections, the interfaces and the "TARA" button.


USB and LAN interfaces


USB and RS232 interfaces

USB and CAN Interfaces



## 2.4. INTERFACES

All devices have a USB interface as standard. The following additional interfaces are available as options:

- LAN
- RS232
- CAN

The CAN bus and the USB interface cannot be operated simultaneously. If the device is connected to the computer via the USB interface, the USB interface is active and the CAN bus is deactivated.

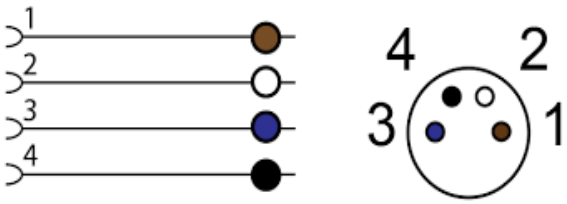
For operation with CAN bus, the power supply must be provided by an external power supply unit.

## 2.5. ELECTRICAL CONNECTIONS AND INTERFACES

### CAN

M8 - CAN Pinout

| Pin | Function | Cable color |
|---|---|---|
| 1 | + Supply | brown |
| 2 | CAN low | white |
| 3 | - Supply (GND) | blue |
| 4 | CAN high | black |




### RS232

SubD – RS232 Pinout

| Pin | Function |
|---|---|
| 2 | TX |
| 3 | RX |
| 5 | GND |

### Stromversorgung

| Pin | Function | Pin |
|---|---|---|
| 1 | + Supply (7-24V) | Middle pin |
| 2 | - Supply (GND) | Shield |


The USB versions (PSC8/16/24-USB) and the CAN variants (PSC8/16/24-CAN) are supplied with power directly via the USB interface from the PC or via the CAN interface. The variant with solenoid valves and the network variants (PSC8/16/24-LAN) require an external supply of 7-24V with 1A.

### Hardware-Trigger (optional)

For devices with trigger input, a trigger signal can be applied to the BNC connector on the rear of the device to synchronize measurements with other devices. To activate the trigger function, the sampling rate must be set to zero via the "RATE 0" command.

The rising edge of the trigger signal triggers the acquisition of the measured values and the data transmission.

The trigger input is galvanically isolated.

BNC

| Pin | Function | Pin |
|---|---|---|
| 1 | + Trigger (3-24V) | Middle pin |
| 2 | - Trigger (GND) | Shield |


### 2.6. UMGEBUNGSBEDINGUNGEN

| | |
|---|---|
| Temperature | 5° C…50° C |
| Humidity | 0…95%, non condesing |
| Medium | Air and noncorrosive gases |

## 3. SOFTWARE

The free xSC-Logger program for the Windows operating system is supplied with the devices. With this program all devices can be configured via the USB interface. The recording and saving of the measured values can also be done via the program with the exception of the CAN interface.

A driver package is provided for the graphical programming language LabVIEW from National Instruments.

The devices can also be operated under Linux.

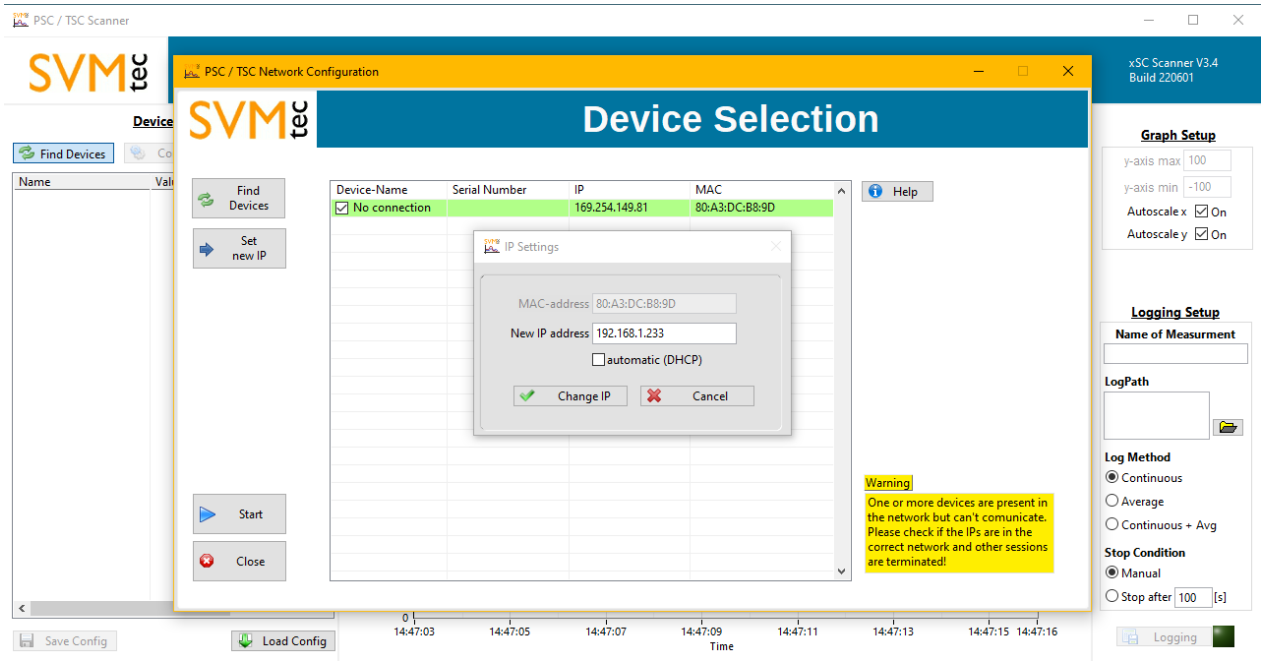
### 3.1. INTERFACE SETUP

As soon as the device is connected to the computer via the USB port, a virtual COM port is created. Thus it can be used with any program that supports the RS-232 protocol.

If not known, the corresponding COM port can be determined via the Windows device manager.

For configuration of the network versin, the supplied software xSC-Logger can be used. With the program PSCx-LAN devices can be found in the network and the IP addresses can be changed.

(Find Devices -> Set new IP)




## 3.2. SERIAL PROTOCOL

The virtual COM port can be operated with any baud rate. Recommended is 19200, 8 data bits, no parity, 1 stop bit. DTR (Data Terminal Ready) must be set.

The following are the available commands for configuring the pressure scanner.

| Command | Function | Reply |
|---|---|---|
| *CAL a x* | Set scaling factor for senor **a** to a value of **x**<br>Caution: This overwrites the factory calibration! | `#Scaler.... Offset....` |
| *CAL? a* | Read the scaling factor of sensor **a** | `#Scaler.... Offset....` |
| *EE_LOAD* | Load calibration data from EEPROM | `#EEPROM:loaded` |
| *EE_SAVE* | Save calibration data to EEPROM | `#EEPROM:saved` |
| **IDN?* | Read device ID | `TYPE FW-VERSION SERIAL No`<br>`e.g.: PSC8-USB 1.8 #SN3xxxx` |
| RATE x | Define sample rate<br>Range x = 10...5000 [ms]<br>Default: *1000[ms] ~> 1[Hz]* | `#Rate=x ms`<br>`#Error: Rate-Range` |
| RATE 0 | Activate Request-Mode<br>Actual values are read only after manual command „?“ is sent | `#Request-Mode active` |

| | | |
|---|---|---|
| TX x | Enable/disable serial output<br>x = 0: deactivate output<br>x = 1: enable output | #TX OFF / #TX ON |
| ? | Request values | 0.00 0.00 0.00 … |
| *RST | Restore default values | #RESET |
| SCAN_A x<br>SCAN_B x<br>SCAN_C x | Define a scanlist (channel list)<br>binary value, each bit corresponds to a channel, see Table 4 | #OK |
| TARA | Perform zero compensation measurement | #TARA |
| FILTER x | Exponential filter setting<br>x = 0: automatic through „RATE" setting<br>x > 0: IIR filter in [ms] | #FILTER |
| MUX x | Input multiplexer switch (only available in MUX-versions)<br>MUX 0 deactivates all inputs | #MUX x |
| MUX? | Read current MUX settings | #MUX 11010001 |

| - only PSC-CAN versions - | | |
|---|---|---|
| CAN_ID x | Set AN-ID | #OK |
| CAN_IT x | Set the frame format<br>x = 0: Normal (11bit, CAN 2.0A)<br>x = 1: Extended (23bit, CAN 2.0B) | #OK |
| CAN_SPEED x | x=0: 125 kBaud<br>x=1: 250 kBaud<br>x=2: 500 kBaud<br>x=3: 1 MBaud | #OK |
| CAN? | CAN-Konfiguration abfragen | #ID:0x[...]_Speed:[baud]_IT:[0,1] |

A command is always terminated with a line break (CR or LF or CR+LF).

The sensor numbering starts in all cases with the number "1".

The values in the "Calibration" and "Scanlist" area can be changed during operation. These parameters remain valid as long as the scanner is connected to a power supply.

Only after the EE_SAVE command has been sent, the parameters are stored permanently and are available even after the power supply has been switched off.

Channels that are not used can be defined and deactivated via a so-called scan list. In each case 8 channels are summarized in a list. The PSC24 scanner thus has three separate lists (SCAN_A, SCAN_B and SCAN_C), while the PSC8 only evaluates the first scan list (SCAN_A).

For this purpose, the binary listing of the individual channels is converted into a decimal number ("x") and transmitted to the print scanner with the SCAN_n x command.

The reset command *RST automatically reactivates all channels.

As an example, the following table shows configuration options for the first two scan lists.

| **Kanal (Scan_A)** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **x** |
|---|---|---|---|---|---|---|---|---|---|
| *Bsp. a)* | **1 (ON)** | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | **1** |
| *Bsp. b)* | **1 (ON)** | **1 (ON)** | **1 (ON)** | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | **7** |
| *Bsp. c)* | **1 (ON)** | **1 (ON)** | **1 (ON)** | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | **1 (ON)** | **135** |
| *Bsp. d)* | **1 (ON)** | **1 (ON)** | **1 (ON)** | **1 (ON)** | **1 (ON)** | **1 (ON)** | **1 (ON)** | **1 (ON)** | **255** |

*Table 4Example for calculation the scanlist-value x*

| **Kanal (Scan_B)** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **x** |
|---|---|---|---|---|---|---|---|---|---|
| *Bsp. a)* | **1 (ON)** | **1 (ON)** | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | **3** |
| *Bsp. b)* | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | 0 (OFF) | **1 (ON)** | **128** |
| *Bsp. c)* | **1 (ON)** | **1 (ON)** | 0 (OFF) | 0 (OFF) | **1 (ON)** | **1 (ON)** | 0 (OFF) | **1 (ON)** | **179** |
| *Bsp. d)* | 0 (OFF) | 0 (OFF) | **1 (ON)** | **1 (ON)** | **1 (ON)** | **1 (ON)** | **1 (ON)** | **1 (ON)** | **252** |

***Caution:*** *By default, all channels are activated and transmitted in ascending order. While using the scanlist, deactivated channels are skipped to reduce overall data volume.*

*If, for example, channels 10, 22, 23 and 24 are in use, they will be sorted in ascending order and transmitted at places 1, 2, 3 and 4.*