

Solid State Pressure Sensor

V3.41

52-Series

FEATURES

- ✓ Compact SMD Package
- ✓ Increased Media Compatibility
- ✓ Standard, Customized or tailored
- ✓ Digital or Analog Output
- ✓ As low as 125 Pa
- ✓ Performance Ceramic



DESCRIPTION

The 52-Series is a miniature and robust pressure sensor with calibrated and temperature compensated SPI, I²C or analog output . Multi-order compensation for correction of offset, sensitivity, thermal errors and nonlinearity are accomplished in factory via an internal DSP running a correction algorithm with calibration coefficients stored in on-chip EEPROM.

A variety of output configuration, including resolution, sampling rate, output interface are available to provide simple and ready-to-use solution for a wide range of application. It can be operated in supply voltage of 3.3V or 5.0 V. Multiple chosen for pneumatic interface are suitable for system integration.

52-Series is not only excellent for differential pressure but also vented gauge and absolute from 125 Pa to 7 bar. Pinhole-free polymer coating is available. Please contact factory for detail.

Specifications – Basic

Parameters	Min	Typ	Max	Unit
Temp - Operating ¹	-20		85	°C
Temp - Compensated ²	0		50	°C
Temp - Storage	-40		125	°C
Humidity ³	0		95	%RH
Over-pressure ^{4,7}	3x			FS
Burst Pressure ^{4,8}	6x			FS
Long-term Stability ⁵			1.0	%FS
Orientation Sensitivity ⁶			0.04	%FS/g
ESD – HBM	-2		+2	kV
Vibration	20g, 10Hz to 2Hz			
Solder Reflow	J-STD-020 MSL 1			
Soldering Profile	260°C, 10 sec.			

NOTES:

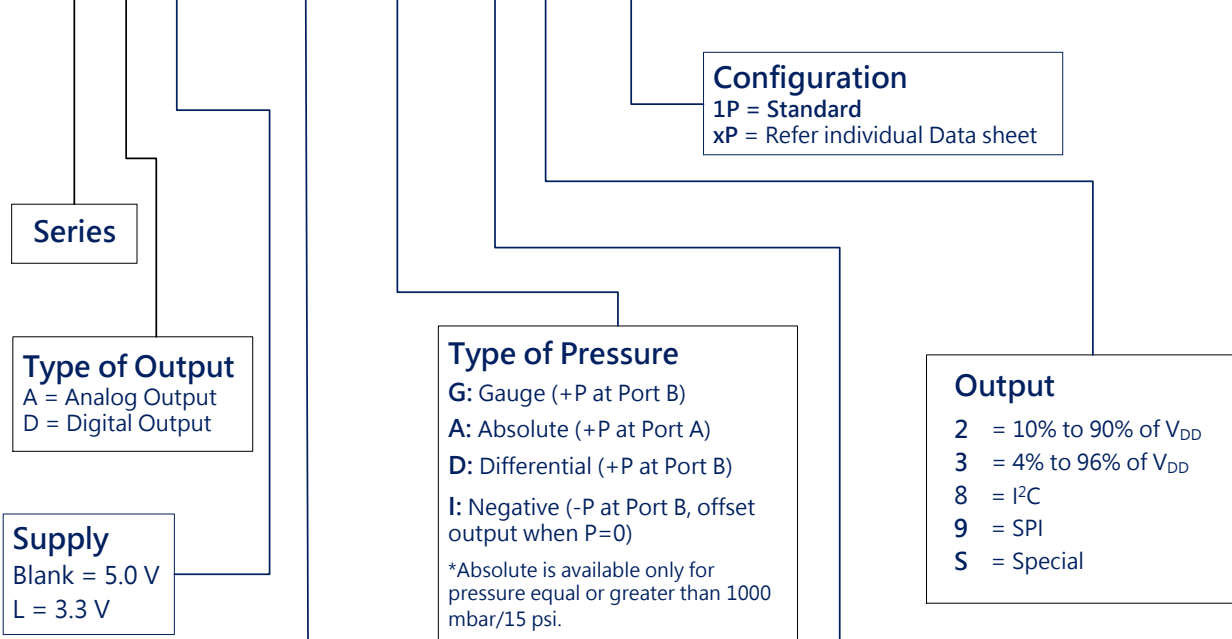
- 40 to 85 °C is available upon request.
- Custom temperature compensation is available upon request.
- Gas only, no condensation.
- Range dependent. Refer to individual data sheet.
- Zero stability to be tested with 120 hour hot storage at 85 °C , which is roughly equivalent to accelerated aging of the part for over a year at Room Temperature.
- Measured orientation effect on the zero output of 0.15 psi sensor with a standard deviation of 0.035% Full-Scale/g.
- Over-pressure (OP): the maximum pressure that may be applied to the sensor without causing a change in performance with respect to the specifications.
- Burst-pressure (BP): The maximum pressure that may be applied to the sensor without a catastrophic failure.

Pressure Range		Accuracy			Accuracy after auto-zero		
psi	mbar	Max	Typ	Min	Max	Typ	Min
0.02	1.25	-2.5	±1.5	2.5	-2.0	±1.0	2.0
0.04	2.5	-2.5	±1.0	2.5	-1.25	±0.5	1.25
0.07	5	-2.5	±0.5	2.5	-1.0	±0.25	1.0
0.15	10	-1.5	±0.5	1.5	-1.0	±0.25	1.0
0.3	20	-1.5	±0.3	1.5	-1.0	±0.15	1.0
0.6/1.0	40/60	-1.5	±0.3	1.5	-1.0	±0.15	1.0
2/100	100/7000	-1.0	±0.25	1.0	N/A		

Table-1 Accuracy over 0/50°C

Ordering Information

52 A L - XXXX G - 3 8 1P



Series

Type of Output
 A = Analog Output
 D = Digital Output

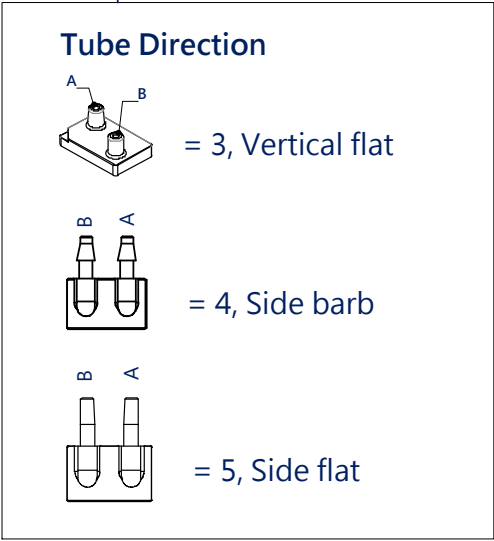
Supply
 Blank = 5.0 V
 L = 3.3 V

Type of Pressure
 G: Gauge (+P at Port B)
 A: Absolute (+P at Port A)
 D: Differential (+P at Port B)
 I: Negative (-P at Port B, offset output when P=0)
 *Absolute is available only for pressure equal or greater than 1000 mbar/15 psi.

Configuration
 1P = Standard
 xP = Refer individual Data sheet

Output
 2 = 10% to 90% of V_{DD}
 3 = 4% to 96% of V_{DD}
 8 = I²C
 9 = SPI
 S = Special

mbar		psi	
1.25	L12B	0.02	L02P
2.5	L25B	0.04	L04P
5	L50B	0.07	L07P
10	100B	0.15	L15P
20	200B	0.3	L30P
40	400B	0.6	L60P
60	600B	1	001P
100	101B	2	002P
200	201B	3	003P
500	501B	7	007P
1000	102B	15	015P
2000	202B	30	030P
4000	402B	60	060P
7000	702B	100	100P



Notes:
 Custom ranges and units are available upon request. Please contact factory.

Examples:

- 52DL-L50BD-381P = -5mbar to 5mbar differential, digital
- 52DL-L50BG-381P = 0mbar to 5mbar differential or gauge (leave port A empty for gauge), digital
- 52A-400BD-321P = -40mbar to 40mbar differential, analog

Specifications – Digital Output

Parameters	Min	Typ	Max	Unit
Supply (V_{DD}) – 3.3V ¹	2.75	3.3	3.6	V
Supply (V_{DD}) – 5.0V ¹	4.75	5.0	5.25	V
Operating Current ²		2.2	3.2	mA
Stand-by Current ³		0.8	1.5	uA
Resolution - ADC	12	16	24	bits
Output (-P) ⁴	6553 (dec) / 1999 (hex)			
Output (Zero) ⁴	32767 (dec) / 7FFF (hex)			
Output (+P) ⁴	58982 (dec) / E666 (hex)			
Accuracy ⁵		±0.5		%FS
Overall Error ⁶		± 2.5		%FS
Update Rate ⁷		1.2		kHz
Start-up Time ⁸			2	ms
Wake-up Time ⁹		2	10	us
Input High Level ¹⁰	0.7		1.0	V_{DD}
Input Low Level ¹⁰	0		0.3	V_{DD}
Interface Clock – I ² C	0.1		3.4	MHz
Interface Clock – SPI	0.05	1	12	MHz

NOTES:

1. 3.3V or 5.0V supply should be ordered separately. Other supply voltage from 2.75 to 5.5V is available upon request. With external JFET, supply voltage from 5 to 48V can be applied providing a special configuration should be ordered.
2. 5V supply and analog output referenced. Current consumption are varied according to supply, response rate and resolution chosen. Normally sensing element is not always excited. Mean current consumption for one complete measurement cycle would be lower than the rated value.
3. Stand-by is for digital output only. Sensor automatically enters into Sleep mode after command execution for minimum current consumption, whereas the interface is still listening and accepts commands.
4. Unsigned integer. Resolution dependent and custom is applicable. For vented gauge, zero is 6553 (dec) 1999 (hex).
5. Combines errors at 25°C after reflow mounting and auto-zero. Pressure range dependent.
6. The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range and compensated temperature. Combines errors of NOL, hysteresis, and repeatability. Pressure range dependent.
7. Single measurement duration in 16-bit with SSC on-chip temperature sensor. Resolution dependent.
8. V_{DD} ramps up to activate Interface Communication.
9. Sleep mode to active state of interface communication
10. Referenced to external supply voltage V_{DD}

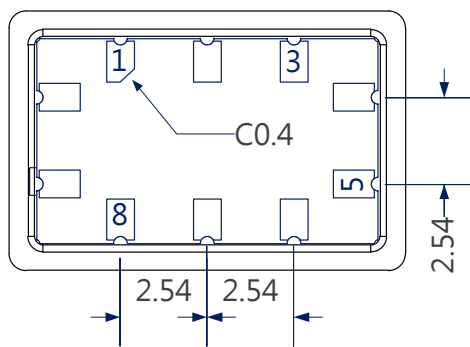
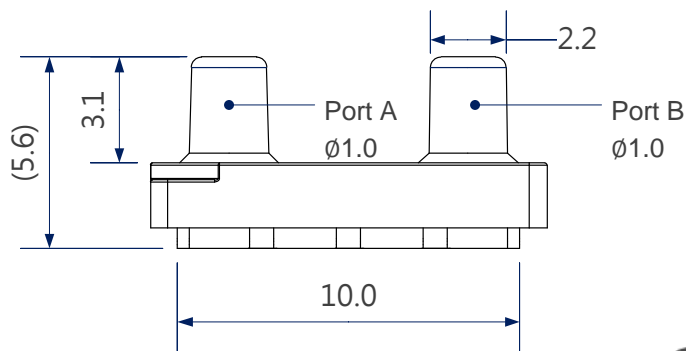
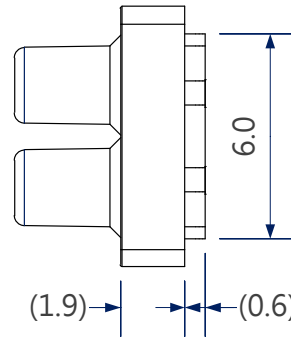
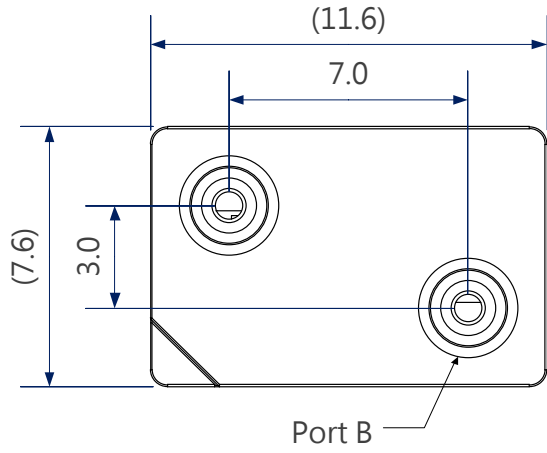
Specifications – Analog Output

Parameters	Min	Typ	Max	Unit
Supply (V_{DD}) – 3.3V ¹	2.75	3.3	3.6	V
Supply (V_{DD}) – 5.0V ¹	4.75	5.0	5.25	V
Operating Current ²		2.2	3.2	mA
Resolution - DAC ³		13	16	bits
Output (-P) ⁴		10%		V_{DD}
Output (Zero) ⁴		50%		V_{DD}
Output (+P) ⁴		90%		V_{DD}
Accuracy ⁵		±0.5		%FS
Overall Error ⁶		± 2.5		%FS
Update Rate ⁷		1.2		kHz
Start-up Time ⁸			2.3	ms

NOTES:

1. 3.3V or 5.0V supply should be ordered separately. Other supply voltage from 2.75 to 5.5V is available upon request. With external JFET, supply voltage from 5 to 48V can be applied providing a special configuration should be ordered.
2. Continuously running measurement sequence is executed.
3. Higher resolution longer step response settling time. Dithering is available upon request and can be switched on or off.
4. V_{DD} -ratiometric voltage. For vented gauge pressure, zero is 10%. Absolute voltage output (0/1V, 0/5V) is also available upon request.
5. Combines errors at 25°C after reflow mounting and auto-zero. Pressure range dependent.
6. The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range and compensated temperature.. Combines errors of NOL, hysteresis, and repeatability. Pressure range dependent.
7. Single measurement duration in 16-bit with SSC on-chip temperature sensor. Resolution dependent.
8. V_{DD} ramps up to activate Digital data to ADC plus DAC settling time.
9. Recommended operating condition with external resistive load 1k Ω and capacitive load 10nF as low-pass filtering configuration at analog output for output bandwidth from 1kHz to 5kHz.

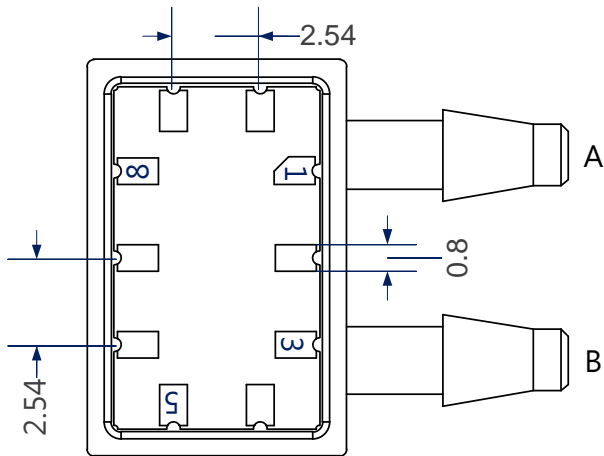
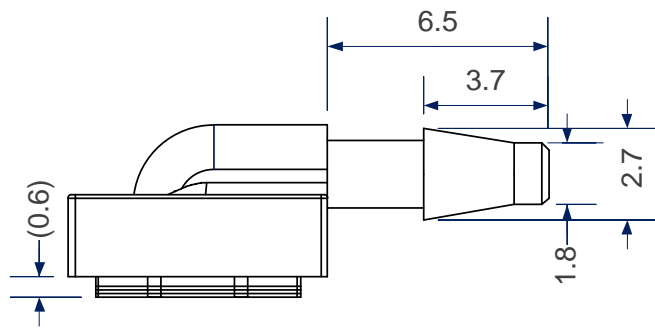
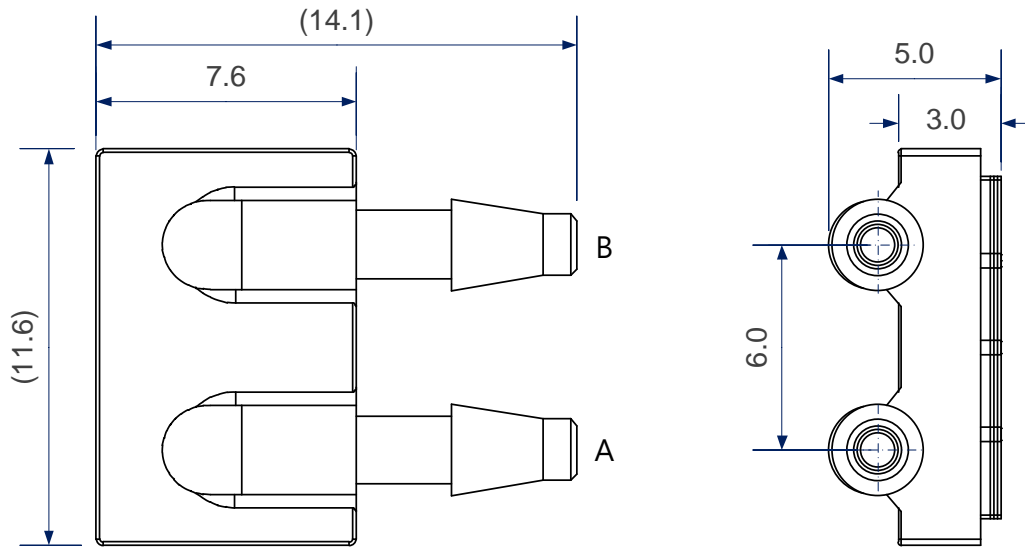
Dimension – Vertical Tube



Bottom View



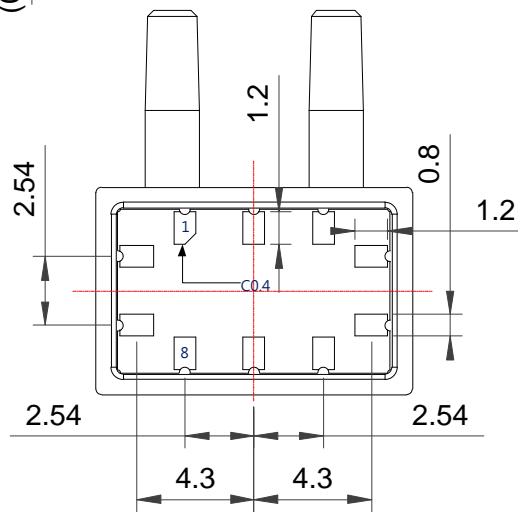
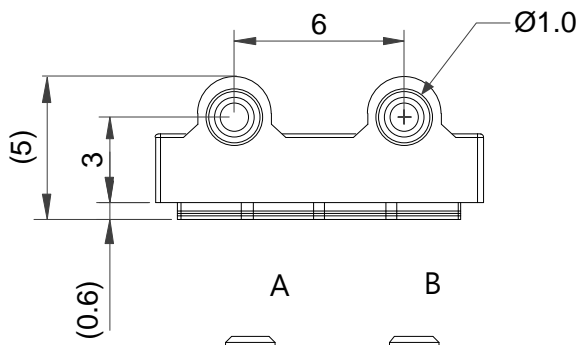
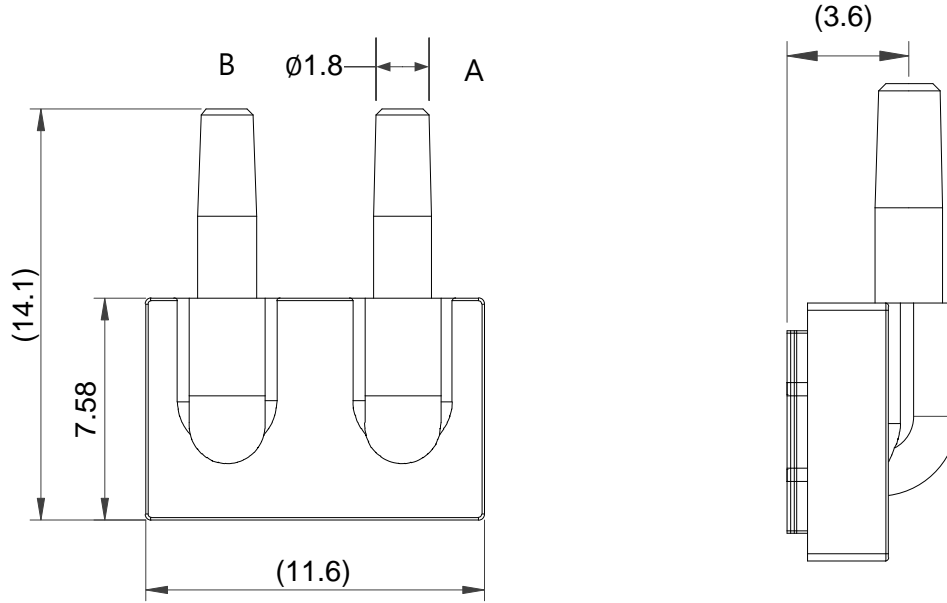
Dimension – Side barb tube



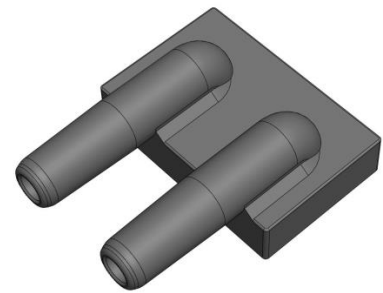
Bottom View



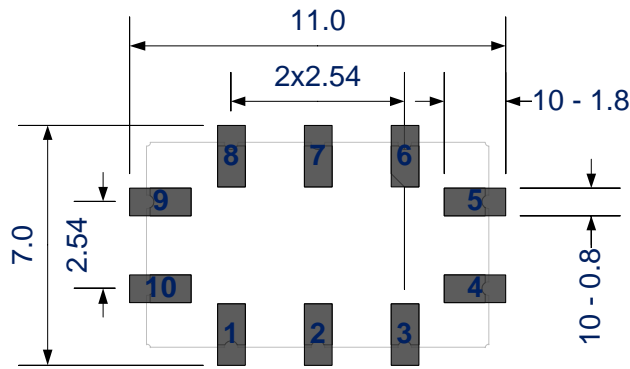
Dimension – Side flat tube



Bottom View



Foot Print



Pinout Assignment

Pad	Description
1	N.C.
2	N.C.
3	N.C.
4	SDA
5	SCL
6	N.C.
7	N.C.
8	N.C.
9	Vdd
10	Vss

Table 1 - I²C

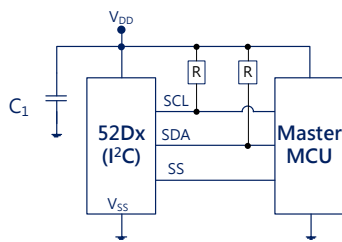
Pad	Description
1	N.C.
2	N.C.
3	N.C.
4	MOSI
5	SCLK
6	MISO
7	SS
8	N.C.
9	Vdd
10	Vss

Table 2 - SPI

Pad	Description
1	N.C.
2	N.C.
3	N.C.
4	N.C.
5	N.C.
6	OUT
7	N.C.
8	N.C.
9	Vdd
10	Vss

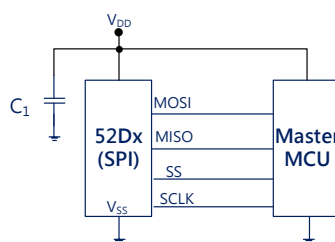
Table 2 - Analog

Application Circuit

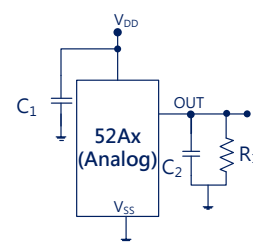


I²C

R = 10k
C₁ = 0.1μ



SPI



Analog

R₁ = 1k
C₂ = 10nF

Headquarter Switzerland:
Pewatron AG
Thurgauerstrasse 66
CH-8050 Zurich
Phone +41 44 877 35 00
info@pewatron.com

Office Germany:
Pewatron Deutschland GmbH
Edisonstraße 16
D-85716 Unterschleißheim
Phone +49 89 374 288 87 00
info.de@pewatron.com



PEWATRON
SENSORS · POWER SOLUTIONS

We are here for you. Addresses and Contacts.

Sales Germany & Austria

Geometrical sensors Other products

Kurt Stritzelberger
Phone +49 89 374 288 87 22
kurt.stritzelberger@pewatron.com

Pressure sensors Other products

Gerhard Vetter
Phone +49 89 374 288 87 26
gerhard.vetter@pewatron.com

Gas sensors and modules

Peter Felder
Phone +41 44 877 35 05
peter.felder@pewatron.com

Sales Switzerland & Liechtenstein

Postcode 3000 – 9999

Basil Frei
Phone +41 44 877 35 18
basil.frei@pewatron.com

Postcode 1000 – 2999

Christian Mohrenstecher
Phone +41 76 444 57 93
christian.mohrenstecher@pewatron.com

Sales International Key Accounts

Peter Felder
Phone +41 44 877 35 05
peter.felder@pewatron.com

Sales Other Countries / Product Management

Pressure Sensors Load Cells

Philipp Kistler
Phone +41 44 877 35 03
philipp.kistler@pewatron.com

Gas sensors Gas sensor modules

Dr. Thomas Clausen
Phone +41 44 877 35 13
thomas.clausen@pewatron.com

Flow / Level / Medical products

Dr. Adriano Pittarelli
Phone +49 89 374 288 87 67
adriano.pittarelli@pewatron.com

Power supplies

Sebastiano Leggio
Phone +41 44 877 35 06
sebastiano.leggio@pewatron.com

Linear position sensors Angle sensors

Eric Letsch
Phone +41 44 877 35 14
eric.letsch@pewatron.com

Accelerometers Sensor elements

Christoph Kleye
Phone +49 89 374 288 87 61
christoph.kleye@pewatron.com

Drive technology

CH Postcode 5000 – 9999 / DE

Roman Homa
Phone +41 76 444 00 86
roman.homa@pewatron.com

Drive technology

CH Postcode 1000 – 4999 / AT / IT / FR

Christian Mohrenstecher
Phone +41 76 444 57 93
christian.mohrenstecher@pewatron.com

Harald Thomas

Phone +49 89 374 288 87 23
harald.thomas@pewatron.com