

# SITRANS P pressure transmitters –

a tight grip on pressure



## SITRANS

Answers for industry.

**SIEMENS**

## The SITRANS P family – The right choice every time

No two processes are alike. No two infrastructures are alike. No two ambient conditions are alike. So why should one SITRANS P be like the next? We offer you a complete family of transmitters with different performance levels, with different pressure ranges, and a broad choice of materials – devices for the various applications in your processes. From “high performance” to “basic”.

The SITRANS P pressure transmitter stands for measuring accuracy, durability and especially for technically advanced user-friendliness. But being technically advanced also comes with its responsibilities. That's why we developed a new device version which also offers you robust, self-diagnostics – plant monitoring and self-monitoring, error diagnostics for higher-than-critical measurements, signaling when calibration is due and many more “monitoring functions”.

For example, the SITRANS P DS III features self-test functions and meets all the demands for fail-safe operation. The transmitter is suitable for use in SIL\*) 2 measurement loops according to IEC 61508/IEC 61511. The SITRANS P DS III is an effective means to prevent errors. This functionality comes at no extra charge since it is a basic feature of the standard version of SITRANS P DS III. SITRANS P DS III ensures safe data transmission via an optional PROFIsafe protocol right through to distributed I/Os.

The SITRANS P family features a product for any application – uniform measuring cells and housings including configuration with SIMATIC PDM!

\*) SIL = Safety Integrity Level



### The facts at a glance:

#### ■ SITRANS P DS III

Digital pressure transmitter with HART, PROFIBUS PA or Foundation Fieldbus communications featuring all-round ease of handling, diagnostic functions and high accuracy.

#### ■ SITRANS P300

Digital pressure transmitter with HART, PROFIBUS PA or Foundation Fieldbus communications and stainless steel housing. For the special requirements in the food, pharmaceuticals and biotechnology sectors.

#### ■ SITRANS P Compact

Analog pressure transmitter series for the special requirements of the food-and-beverage, pharmaceuticals and biotechnology industries.

#### ■ SITRANS P ZD

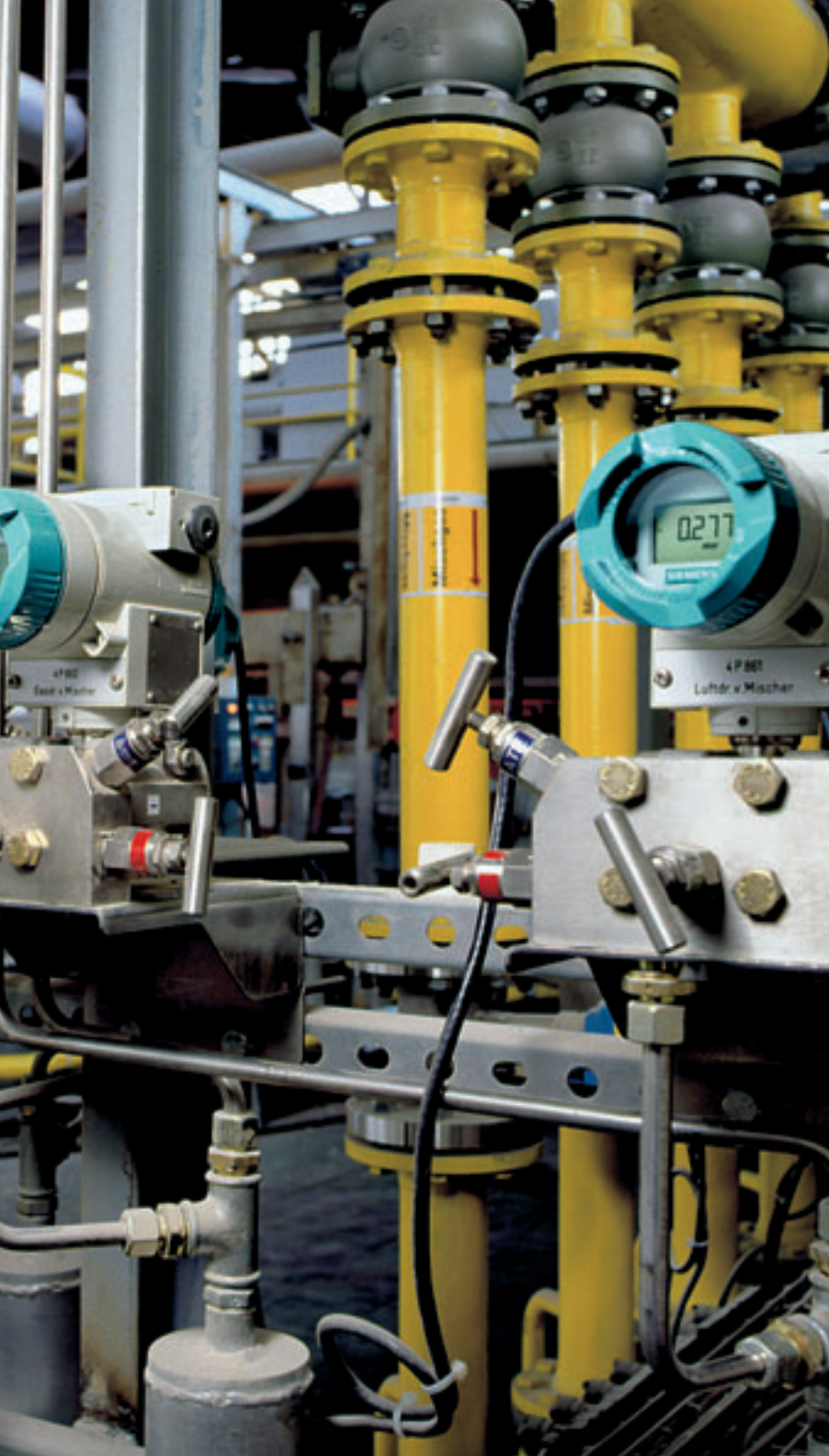
Digital pressure transmitter with a stainless steel housing and display.

#### ■ SITRANS P Z

Single-range transmitter with ceramic and stainless steel cells.

#### ■ SITRANS P MPS

Pressure transmitter for convenient hydrostatic level measurement.



## SITRANS P sets standards

### ■ User-friendly and precise

Leave the screwdriver and other implements in the toolbox when setting zero points, ranges, damping, etc. Blind adjustment with three magnetic pushbuttons and the large programmable display yield the same level of accuracy.

### ■ High quality and long life

The SITRANS P has a MTBF of over 300 years. After installation you will be able to confirm the device's legendary reliability – and the savings in time and costs it affords.

### ■ Tough cookie

Does your application involve extreme chemical and mechanical stress? The SITRANS P can take it in stride. The same goes for electromagnetic interference – the SITRANS P is protected thanks to an EMC rating of 10 kHz to 1 GHz.

### ■ Convenient and versatile

Versatility to fit any application has been a longtime standard for the SITRANS P. Configuration of the SITRANS P can be accomplished by using the 3 magnetic pushbuttons, by HART communicator or using a computer with PDM. Anything goes. The modularity of the SITRANS P is also beneficial: since sensor-specific data is stored in the measuring cell, the potted electronics module can be replaced without a problem. In the event of a problem the 100 : 1 turndown allows a single transmitter to serve as back-up to many different ranges thus reducing the quantity and cost of spares.

### ■ Classy communications

In addition to local configuration using the magnetic pushbuttons, you can configure the SITRANS P transmitter remotely via HART or PROFIBUS. You can even capture critical pressure and temperature excursions using so-called "Min/Max pointers".

\*) MTBF = Mean Time Between Failure



## Maximum reliability for the device and your process:

The DS III series ...

Reliability for the process, reduced downtime for your plant, higher quality for the produced goods – can a transmitter make a big difference?

It certainly can, once it makes the step from a simple “value indicator” to a “value analyzer”. Like the SITRANS P, the first transmitter with integrated diagnostic functions. It monitors itself and other process conditions in your plant at regular intervals.

All in all, SITRANS P helps plant operators and increases user confidence in the process pressure information.

### Advanced transmitter diagnostics with SITRANS P means:

- Dual elapsed time registers – these can be set up to signal when Preventative maintenance or Calibration is required.
- Three freely adjustable limits: That means you can implement pre-alarms and/or monitor the temperature.
- A record of the limit violations: Based on maximum pointers for min./max. values for input pressure, sensor temperature and electronic temperature. The record provides information on the status of the new SITRANS P, on the process and on the ambient temperature.
- Simulation function: Enabling the transmitter electronics and the entire loop to be checked directly after the sensor, e.g. for system startup. This provides important information on whether the transmitter electronics are in proper order, at what pressure the limits respond and whether the controller loop is working properly and all the displays are functioning, etc.
- Easy plug-out/plug-in exchange of defective parts: – even on-site – if the device signals an error in the electronics or measuring cell; no recalibration required.



The DS III series



### Just a matter of adjustment

Three pushbuttons and a high-contrast LCD is all you need to set the parameters on-site. You can set the minimum and maximum measurement range, adjust the damping of the output and the failsafe direction Hi or Low – all without having to open the cover on the transmitter, thus maintaining the hazardous area rating. You can also change from linear to square root or adjust the measurement range up to a ratio of 100 : 1 at the push of a button. Electronic damping of up to 100 s can be selected. It is also possible to select up to 17 different pressure engineering units.

And what if you're looking for the most convenient way to check the current loop? Then the SITRANS P can be put into a current source mode to facilitate loop checkout.



### No hard work with HART

Of course, you can also use the HART protocol to set all the transmitter parameters using a HART communicator, laptop or PC or any HART-compatible process control system. Using HART, all parameters and diagnostic information can be viewed at any point in the signal loop.

The software SIMATIC PDM makes this very easy for the user.

### Digital fieldbus communications via PROFIBUS

In reality, it's just an interface. But it also gives users access to fully digital communications via PROFIBUS PA, even in hazardous areas. The PROFIBUS device can communicate the process values and diagnostic information in a single digital communication.

That means SITRANS P can easily communicate with PROFIBUS-compatible process control systems such as SIMATIC PCS 7 and others. SIMATIC PDM (Process Device Manager) makes installing and operating a snap.

### Sound and certified durability

Extreme pressures, high temperatures and aggressive measuring media – the SITRANS P can take it all. This claim is backed up by certificates and official approvals from all over the world such as CENELEC (Europe), FM (USA), CSA (Canada), INMETRO (Brazil) and NEPSI (China). For further certificates, please click [www.siemens.com/fielddevices](http://www.siemens.com/fielddevices).



The SITRANS P DS III transmitter features a special safety standard for pressure, differential pressure, absolute pressure and fill level. The transmitter is suitable for use in SIL 2 measurement loops according to IEC 61508/IEC 61511. Safety-related functions include automatic error diagnostics, defined error handling as well as calculation of the error rate.



The DS III series



With the safety values calculated in accordance with IEC 61511 and a failure rate of once in 300 years, the SITRANS P DS III is designed for use in plants where safety and reliability are paramount. And since this is our standard device, you pay nothing extra for this feature.

#### A special advantage:

With only one SITRANS P DS III the same safety level can be reached as with two conventional transmitters.

That means you save the costs of an extra transmitter, including the installation and maintenance costs, extra wiring and extra isolating power supplies. Not to mention the cabinet space you save!

Experience in a number of applications has shown just how well-designed the SITRANS P DS III is for real-life practice. If you want a high level of safety and reliability, you should put DS III at the top of your list, even with regards to PROFIsafe functionality. Using the PROFIsafe protocol, Siemens is the first manufacturer to ensure safe data transmission from the field level to the control level.

**SIEMENS** SIL Konformitätserklärung  
Funktionale Sicherheit nach IEC 61508 und IEC 61511

Siemens AG  
Automatisierungstechnik  
Produktionsentwicklung und -prüfung  
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Produkt: SITRANS P DS III (2004-10-01)

Bestandteile: SITRANS P DS III (2004-10-01)  
Hardware: SITRANS P DS III (2004-10-01) Firmware: SITRANS P DS III (2004-10-01)

Wir erklären als Hersteller, dass die Produktfunktionskonformität für den Einsatz in sicherheitskritischen Anwendungen gemäß der IEC 61508/IEC 61511 nachgewiesen ist. Die entsprechenden Sicherheitsfunktionen werden geprüft und eingetragenen.

Die Ausführung wurde durch eine FMEA (Failure Mode and Effects Analysis) nach IEC 61508-1 bestätigt. Die Berechnung der Störereignisrate wurde durch den TÜV bestätigt.

Sicherheitsfunktionsspezifische Parameter SITRANS P DS III	
ML Safety Integrity Level (SIL) nach IEC 61508-1	1
MTTF	10 <sup>6</sup> h
MTBF	1,00 x 10 <sup>6</sup> h
$\lambda_{\text{D}}$ Safe failure	10 <sup>-6</sup> FIT
$\lambda_{\text{D}}$ Dangerous failure	10 <sup>-6</sup> FIT
$\lambda_{\text{D}}$ Dangerous detected failure	10 <sup>-6</sup> FIT
$\lambda_{\text{D}}$ Dangerous undetected failure	10 <sup>-6</sup> FIT
Mean time	10 <sup>6</sup> h

Die Parameter gelten für die Betriebsspannung und -temperatur in der Dokumentation. Für die Berechnung der Störereignisrate nach IEC 61508-1, Anhang B, ist die folgende Formel zu verwenden:

$$MTTF = \frac{1}{\lambda_{\text{D}} + \lambda_{\text{D}} + \lambda_{\text{D}}} \quad PFD_{\text{max}} = \lambda_{\text{D}} \cdot T_{\text{D}} \quad PFD_{\text{max}} = 10^{-6}$$

Die Parameter sind berechnungsorientiert durch unsere Kunden. Änderungen werden gemäß IEC 61508 durchgeführt.

Stuttgart, 27.08.2004  
Siemens AG

Dr. Schmitt, General Manager Automatisierungstechnik  
Dr. Müller, Regionaler Geschäftsführer

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## The reference in a stainless steel housing: The SITRANS P300 ...

Just like the SITRANS P DS III, the SITRANS P300 stands for precise measuring and ruggedness, and especially for an innovative operating concept. With the SITRANS P300, these time-proven features are now also available for processes in the food & beverage and pharmaceutical industries.

With a maximum error of measurement of 0.075%, a sanitary stainless steel housing with laser-inscribed name plate, and the time-proven SITRANS P DS III operating philosophy, it fits in perfectly with the SITRANS P product range.

Cleaning and sterilization in place during measurement result in no drift up to the specified temperature range of 482 °F/ 250 °C. Evaluation of the cleaning process is supported by drag pointers which record the minimum and maximum sensor temperature values. The process data can be read out through a HART, PROFIBUS PA or Foundation Fieldbus interface.



The SITRANS P300 can also be combined with absolute and relative pressure measuring cells. The range of process connections includes connections for the food & beverage industry, the pharmaceuticals industry, the paper industry going all the way to common thread and flange variants.

An important feature of the measuring cells is the process connection, which is welded together with the measuring cell diaphragm. Thus there are no seals on the process side, which could be a possible hiding place for bacteria. The roughness of all components

that come into contact with the measured substance is ensured according to EHEDG. This also applies to the welding seams mentioned above.

It is also worth mentioning the optional extended temperature range up to 250 °C/ 482 °F, which allows the transmitters to be used in applications for which remote seals had to be used in the past. This is where the SITRANS P300 stands out thanks to its increased accuracy of measurement and shorter delivery times as compared to remote seals.



The P300 series



## The SITRANS P: For precision in any position:

Precision. Durability. That is the reputation of the SITRANS P for customers who have used them. The list of users reads like a "Who's who" of international industry. Want some facts to back that up? It features a full scale accuracy of 0.075%. It can also boast 99% measurement precision after 10 years of continuous operation. These features allow the user to save considerable money in maintenance costs.



### **Blind setting – no reason to sacrifice measuring accuracy**

Do you think making blind settings without a pressure source is convenient, but not what you are used to? Then you'll be quick to appreciate power of this feature of SITRANS P. This method of setup utilizes the inherent precision of the capsule to set the desired lower and upper range values.

### **Consistent precision – despite rough surroundings**

If you were wondering what a SITRANS P can take in real-life use, then visit our test labs. We test each device there under extreme conditions before delivery.

Differential transmitters are subjected to pressures of up to 9000 psi/ 630 bar, pressure transmitters are subjected to six times the maximum measured value. Tests have even shown that, based on their high mechanical integrity, cells which were originally designed for a maximum pressure of 5800 psi/400 bar can withstand pressures exceeding 1000 bar without a problem, thanks to their mechanical safety – i.e. without being destroyed. It's no wonder that the SITRANS P has received so many international certifications and approval ratings. Even the WIB – an international group of process device users – has confirmed the outstanding durability and safety level of SITRANS P.

### **Metal housing for any application**

We could have made do with a plastic housing for the electronics. But we wanted to offer maximum durability and ruggedness and wouldn't settle for the second-best solution even for any of the details: that's why we chose a metal housing.

The SITRANS P range even offers the right solution for applications in extremely aggressive media. Devices subject to highly corrosive conditions come equipped with an isolating diaphragm made of stainless steel, Hastelloy, tantalum, monel or gold, and the electronics housing comes in either cast aluminum or stainless steel.

### **Remote seals**

These pressure accessories are used to measure hot, aggressive, highly viscous or crystallizing mediums. They come in the following versions:

- Flange in compliance with DIN, ANSI etc. either rigidly connected to the transmitter or via a flexible capillary tube.
- Various filling liquids for medium temperatures of up to 750 °F/ 400 °C
- Various diaphragm materials
- Range of special industry versions – for example, the food-and-beverage industry



Remote seals



## The specialist for food and beverage, pharmaceuticals and biotechnology: The Compact series ...



*The Compact series*

The SITRANS P Compact is an analog transmitter for measuring absolute and gage pressure. It was developed with the special requirements of the food-and-beverage/pharmaceuticals/biotechnology industries in mind. The devices are designed to meet the hygienic recommendations of EHEDG, FDA and GMP. A number of aseptic process connections made of stainless steel and a stainless steel housing (IP67) were included in the Compact series to meet the more stringent hygienic requirements. High surface quality was a special focus, with an option to electropolish the system. Our pressure measurement specialist "Compact" complements its cleaning and sterilization process (CIP, SIP) with no-drift, error-free functionality.

### Pressure transducer The Z and ZD series ...



*The Z and ZD series*

In the Z series, we use two types of diaphragm materials: stainless steel or ceramic. That makes measuring process pressure, absolute pressure and hydrostatic pressure a breeze. You can set the pressure measured with these sensors to be transformed into either a 4–20 mA or 0–10 V signal.

The digital pressure transducer SITRANS P ZD also features a display and 10 : 1 turndown option. The housing and process connection are made of stainless steel. The digital display is available as a radial or axial assembly to the process connection.



### SITRANS P MPS For measuring levels

The SITRANS P, MPS series is a transmitter for hydrostatic level measurement. It's dipped into the medium hanging at the end of a cable. The sensor's stainless steel housing makes it suitable for use in everything from drinking water to aggressive liquids.



*The MPS series*

## The SITRANS P family – Designed to meet any requirement

Fill level, pressure, differential pressure and absolute pressure from 0.4 in H<sub>2</sub>O to 5800 psi with methods of process connection: different requirements and application conditions call for a matching transmitter version – different media even call for just the right kind of material. The SITRANS P series offers the proper device for any requirement and any medium!

	SITRANS P DS III	SITRANS P300	SITRANS P Compact
Pressure levels	Gage, absolute, differential pressure	Gage, absolute pressure	Gage, absolute pressure
Applications	Process pressure, fill level, differential pressure, flowrate	Process pressure, fill level	Process pressure, fill level
Measuring range	0.4 inH <sub>2</sub> O to 5800 psi 1 mbar to 400 bar	3.2 inH <sub>2</sub> O to 5800 psi 8 mbar to 400 bar	2.3 psi to 580 psi 160 mbar to 40 bar
Diaphragm material	Stainless steel, Hastelloy, tantalum, monel, gold	Stainless steel, Hastelloy	Stainless steel
Output	4 ... 20 mA analog with HART signal, PROFIBUS PA, Foundation Fieldbus	4 ... 20 mA analog with HART signal, PROFIBUS PA, Foundation Fieldbus	4 ... 20 mA analog
Temperature of measured medium	–40 °F to +212 °F –40 °C to +100 °C	–40 °C to +150 °C, optionally +250 °C –40 °F to +312 °F, optionally +482 °F	Max. 392 °F/200 °C depending on design
Accuracy	0.075%	0.075%	0.2% from max.
Max. turndown	100 : 1	100 : 1	–
Long-term drift	0.25%/5 years	0.25%/5 years	0.1%/1 year
Process connection	Flange in compliance with EN 61518 and DIN 19213 with female thread, G1/2A male thread, 1/2–14 NPT female thread	Flush mounted diaphragm with various hygienic thread connections, flange or clamp-on connectors	Flush mounted diaphragm with various quick-seals, aseptic connections, flanges
Certificates/approvals	ATEX, EEx i, EEx d, FM is/xp, CSA is/xp, NEPSI, ABS, SIL declaration of conformity, ...	ATEX, EEx i, FM is, CSA is, EHEDG, FDA, 3A	ATEX, EEx ib, FDA, EHEDG, ...







SITRANS P ZD	SITRANS P Z	SITRANS P MPS
Gage, absolute pressure	Gage, absolute pressure	Hydrostatic pressure
Process pressure, fill level	Process pressure, fill level	Fill level
5.8 psi to 5800 psi 400 mbar to 400 bar	1.5 psi to 5800 psi 100 mbar to 400 bar	6 ftH <sub>2</sub> O to 60 ftH <sub>2</sub> O 2 mH <sub>2</sub> O to 20 mH <sub>2</sub> O
Stainless steel	Stainless steel, ceramic	Stainless steel
4 ... 20 mA analog	4 ... 20 mA analog	4 ... 20 mA analog
-22 °F to +212 °F -30 °C to +100 °C	-22 °F to +248 °F -30 °C to +120 °C	14 °F to +176 °F -10 °C to +80 °C
0.25% from max.	0.25% from max.	0.2% from max.
10 : 1	—	—
0.25%/year	0.3%/year	0.2%/year
G1/2A male thread, G1/8A female thread, 1/2–14 NPT female thread	G1/2A male thread, G1/8A female thread, 1/4 NPT male, 1/2 NPT female	
—	ATEX, EEx ia, Lloyd's Register of Shipping, ...	ATEX, EEx ia, ...





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