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## VitalSensors PROFIBUS PA Instruments and SIMATIC PDM

Connecting a VitalSensors PROFIBUS PA Instrument to SIMATIC PDM using PROFIBUS PA

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### Objective:

- Become familiar with the instrument wiring requirements and PROFIBUS PA
  - Become familiar with SIMATIC PDM configuration tool
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### Equipment:

- |  |                    |
|--|--------------------|
| • Siemens PROFIBUS PA instrument         | Profibus interface |
| • Siemens PROFIBUS PA instruction manual | PC or laptop       |
| • SIMATIC PDM ver. 6.0 (SP. 1)           |                    |
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While every effort was made to verify the following information, no warranty of accuracy or usability is expressed or implied.

### Overview:

SIMATIC Process Device Manager (PDM) is the Siemens configuration software used to set up any VitalSensors PROFIBUS PA device. All parameters are accessed through PDM, and configuration data is saved in projects. SIMATIC PDM also provides diagnostic information, permitting the user to view echo profiles and check set points.

There are two popular methods of connecting a PROFIBUS DP network to a PROFIBUS PA network:

- Using a coupler
- Using a link-coupler

This guide discusses the simplest form of setup, using the coupler.

To ensure that SIMATIC PDM connects properly, please complete the two processes outlined in Initial Setup:

- Installing the Device Description from the VitalSensors provided CD
- Installing the PROFIBUS DP interface card

In this Application Guide, the example of a VS-1000 Sensor System is used. However, the same procedures apply to any VitalSensors PROFIBUS PA instrument.

- The folder **Simatic PDM Setup Files** - contains all the files necessary to setup Simatic PDM including; Devices file, DDL files (file name VS300), and GSD files
- The GSD file is named VS300A28
- The files are available on the VitalSensors Software and Documentation CD or at the company's website at [www.vitalsensortech.com](http://www.vitalsensortech.com)

This Application Guide discusses the following topics:

- Setting up SIMATIC PDM
- Setting up a PROFIBUS network
- Adding the VitalSensors instrument (PROFIBUS PA version) to a project
- Viewing and editing parameters
- Using SIMATIC PDM LifeList for quick access

With the release of version 6.0, a single point version was introduced. The single point version uses a different method to connect to the field instrument, connecting to one instrument instead of supporting the advanced networking like all other versions of PDM. With the single point version, there is no need to create a project. The device is accessed via LifeList using the procedure outlined at the end of this guide.

## Initial setup

### Installing SIMATIC PDM

Using the defaults, install SIMATIC PDM as per the instructions on the purchased CD. Be sure to insert the Device Library CD at the section called Manage Device Catalog. All the Device Descriptions (DDs) must be selected. **Please note that VitalSensors provides the Simatic PDM Device Descriptions on a VitalSensors supplied CD.**

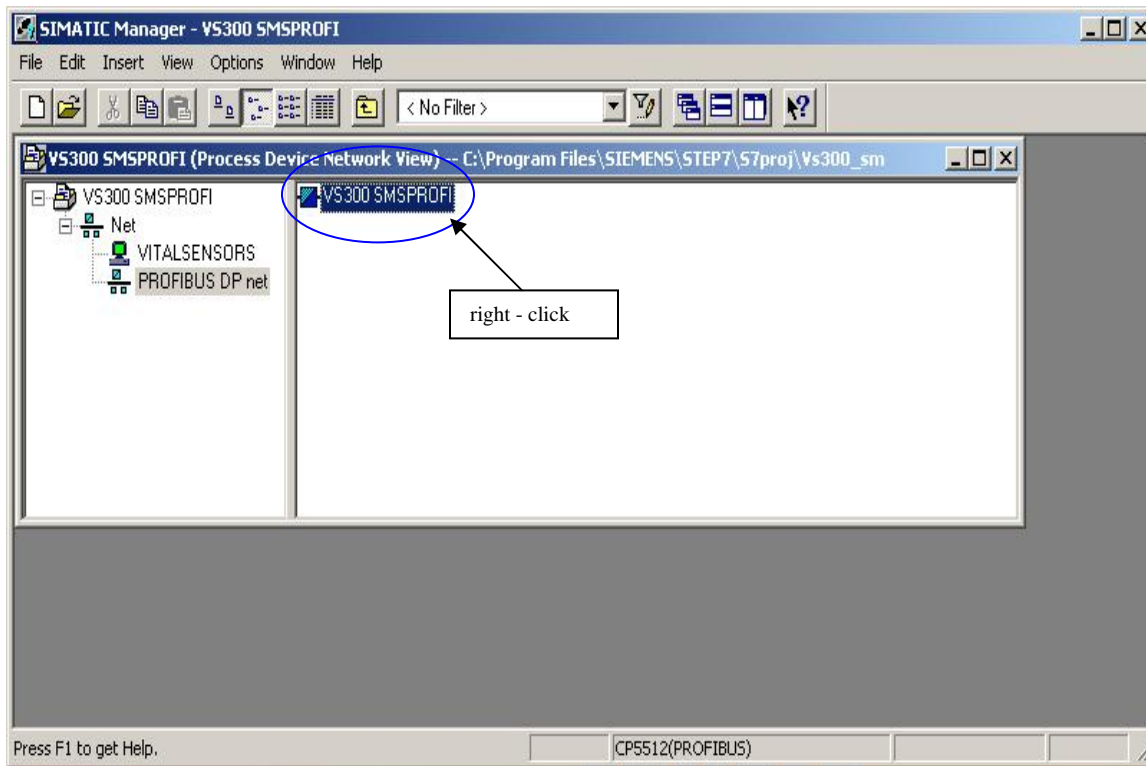
### When to update the device description

Although SIMATIC PDM is shipped with the Device Descriptions that are current when the software was last released, updates and revisions to the DD between releases of PDM may lead to discrepancies. Please note that the DD being used must match the revision number of the product. As a general rule, VitalSensors recommends updating to the latest DD (see below for instructions).

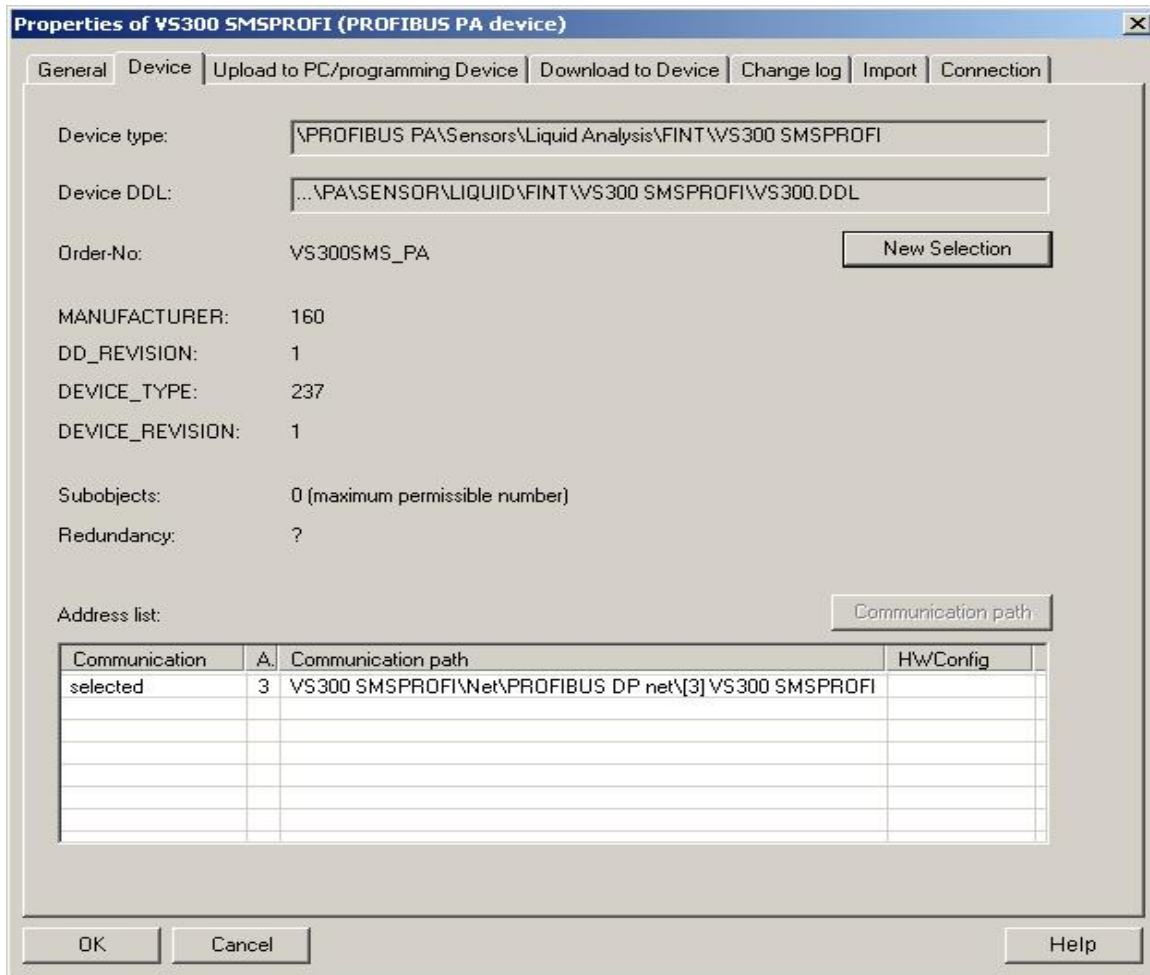
After a project has been created, the DD can be viewed.

**NOTE:** See the section entitled *Opening up a New Project* on page 7 for detail on launching a project

1. Right-click the object and select Object properties.



2. Select the **Device** tab.
  - Under the Device tab, the DD\_REVISION is displayed. Select a different DD by clicking on New Selection.



### Updating the device description if necessary

**NOTE:** Make sure that SIMATIC PDM software is not running while the device description is updated.

The latest PROFIBUS device description for Simatic PDM if required is available for free download from the instrument's product page at [www.vitalsensortech.com](http://www.vitalsensortech.com)

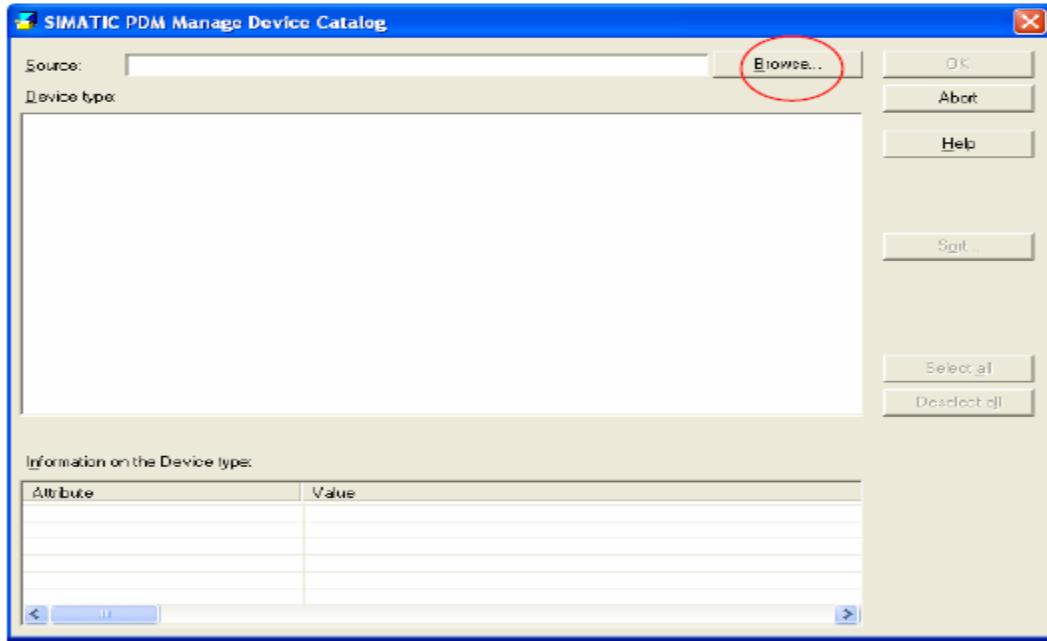
1. On the product page, go to **Downloads** and select the appropriate DD. For example, if you are connecting to a VS-1000 Sensors System, go to the VS-1000 product page and select **PROFIBUS VS-1000 version ... for SIMATIC PDM**.
2. Save the **ZIP** file to a directory on the terminal and then double-click to open it.

For versions prior to 6.0:

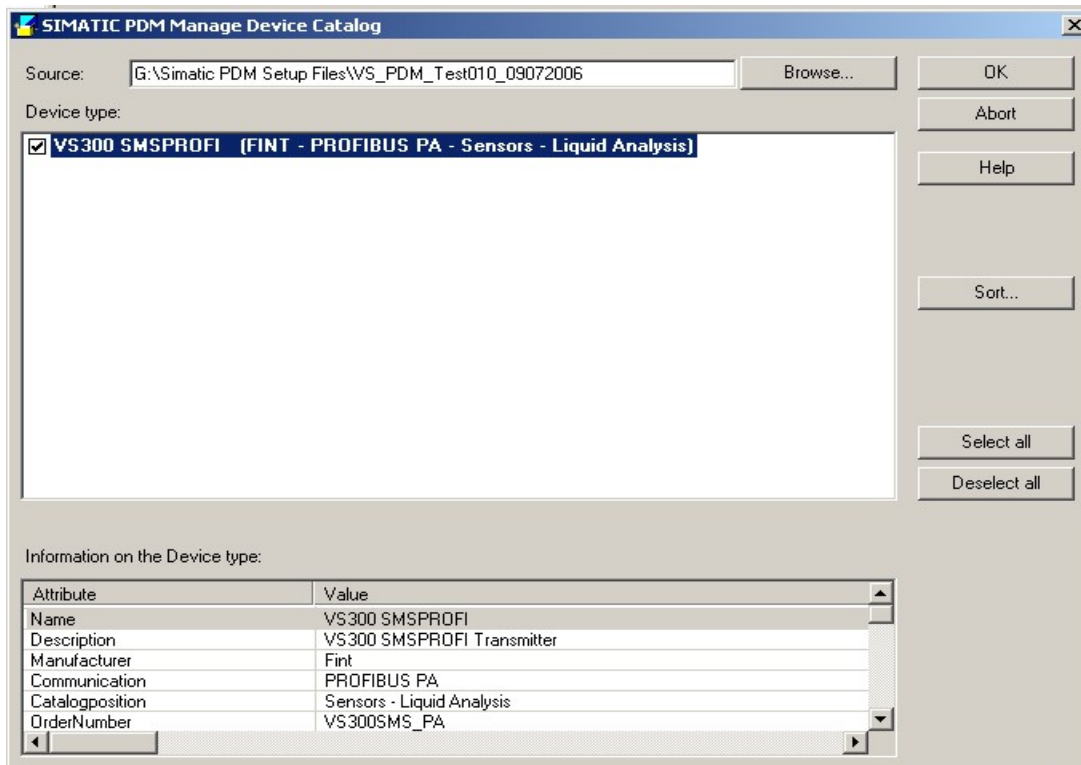
1. Extract the files to a directory, and run the program **DeviceInstall.exe**.
2. **DO NOT** run this program from within the **ZIP** window because it will not install correctly.
3. Follow the directions in the installation wizard.
4. After installation, close and delete the **ZIP** file.
5. Open **SIMATIC PDM**.

For version 6.0 and newer:

1. Extract the files to a directory and then run the program called **Manage Device Catalog** (found under **SIMATIC/SIMATIC PDM**).



2. Click Browse to locate the extracted files. – **File name is: Simatic PDM Setup Files or similar**



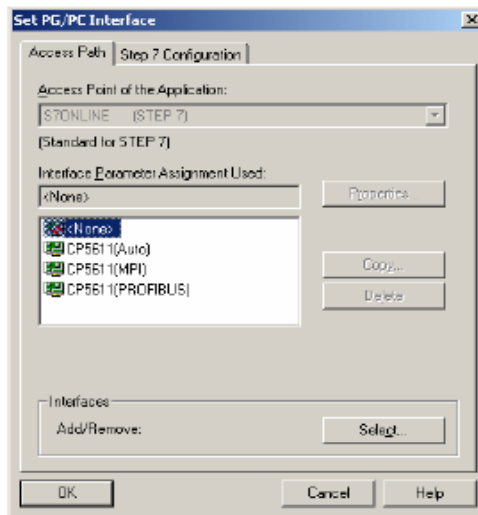
3. Click **OK**.
4. Select the desired **DDs** which is **VS300 SMSPROFI** as shown above and click **OK** to import.

### Installing PROFIBUS DP interface card

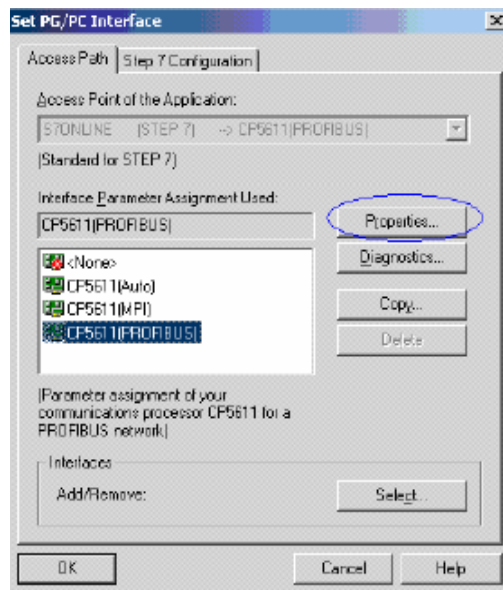
The recommended PROFIBUS DP interface cards are:

- CP5611 (for desktop computers)
- CP5511/CP5512 (PCM/C1A card for laptop computers)

1. After installing SIMATIC PDM, power down the terminal.
2. Plug the appropriate card into the slot.
3. Power up: the Operating System automatically recognizes the interface card and sets it up.
4. Click **Start/ SIMATIC/STEP 7/Setting the PG/PC interface**.



5. In the Access Path window, highlight **CP5611/CP5612 (PROFIBUS)** and click **Properties**.

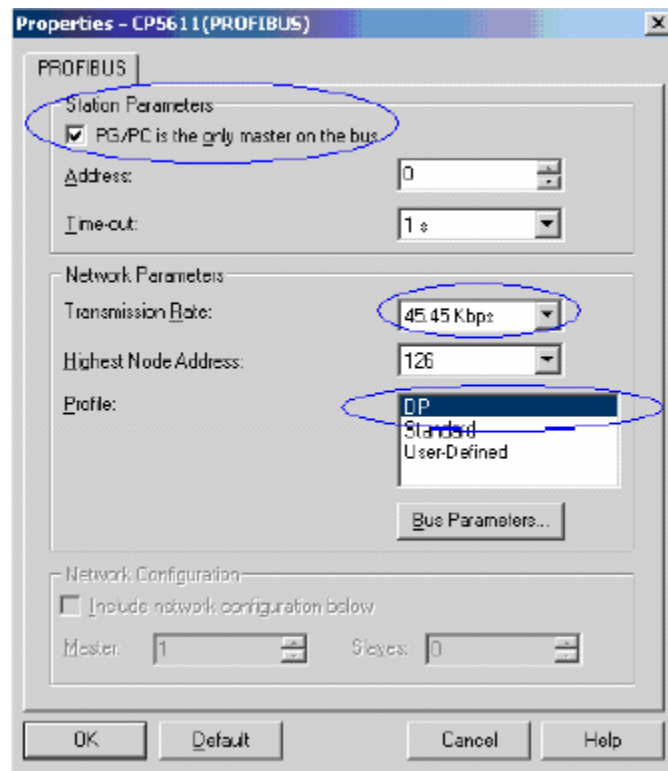


6. In the **Properties** window:

- verify the Profile is **DP**
- select a transmission rate of **45.45 kbps** or **93.5** for a **Pepperl-Fuchs** coupler

**IMPORTANT!**

- If you are connected to a network with a PROFIBUS Master, then make sure **PG/PC is the only master on the bus** is unchecked.
- if your computer is the only Master, make sure **PG/PC is the only master on the bus** is checked.



7. Click OK to close the PROFIBUS window and again to close the Access Path window.

**Wiring in the coupler**

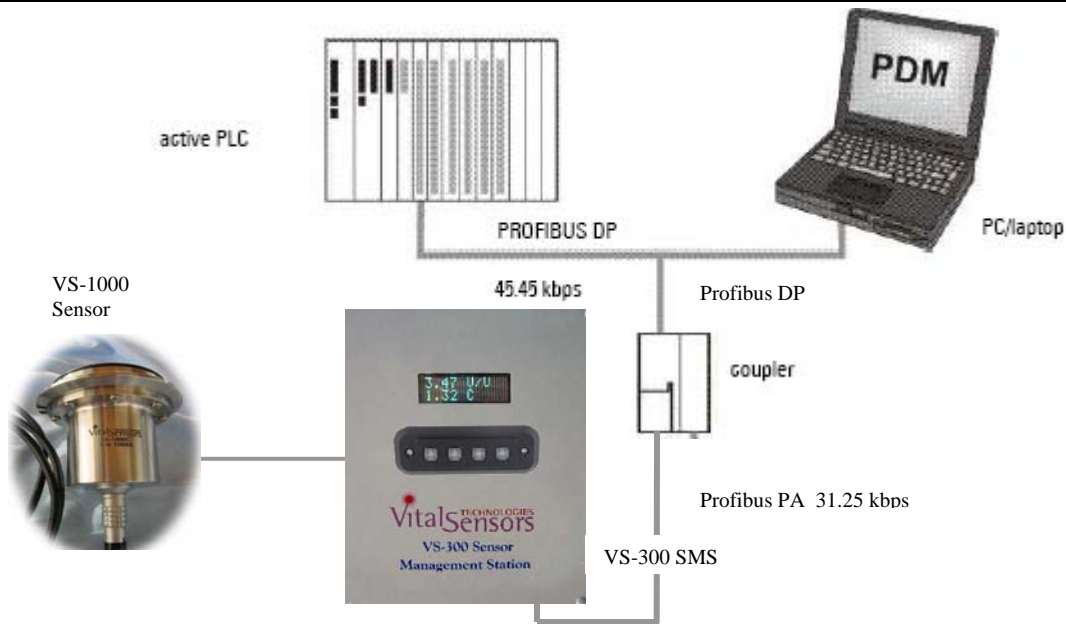
1. Using the instruction manual as a guide, terminate the wires inside the VS-300 SMS housing to the appropriate terminals.
2. Connect the coupler to VitalSensors VS-1000 and VS-300 SMS and to the PC.

**NOTES:**

The VS-300 SMS PROFIBUS PA Transmitter is provided with a Profibus four pin Eurofast connector  
 Devices may be either 2 wire or 4 wire:

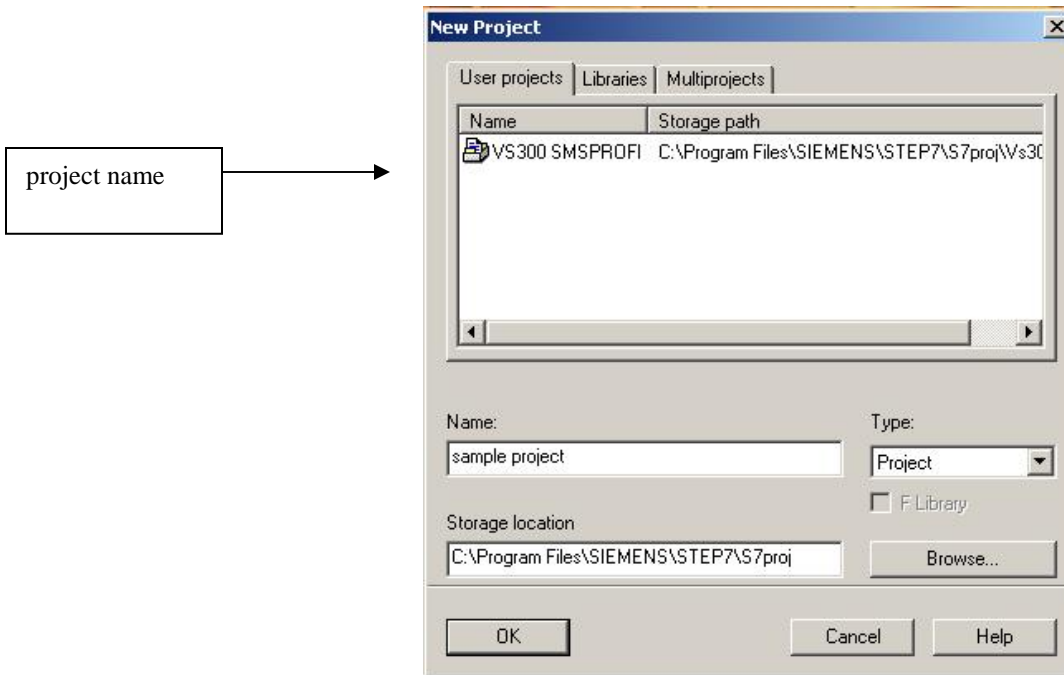
The VS-1000 Sensor System is a 2 wire device on the Profibus side

Power to the system is provided by line voltage from the plant – 110 to 240V through a separate cable

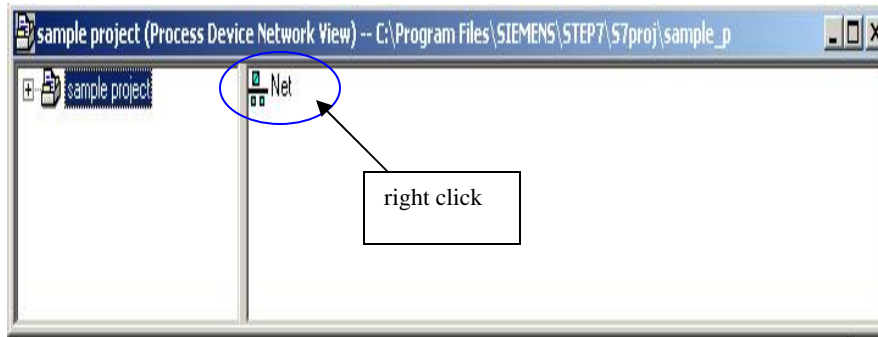


## Opening up a new project

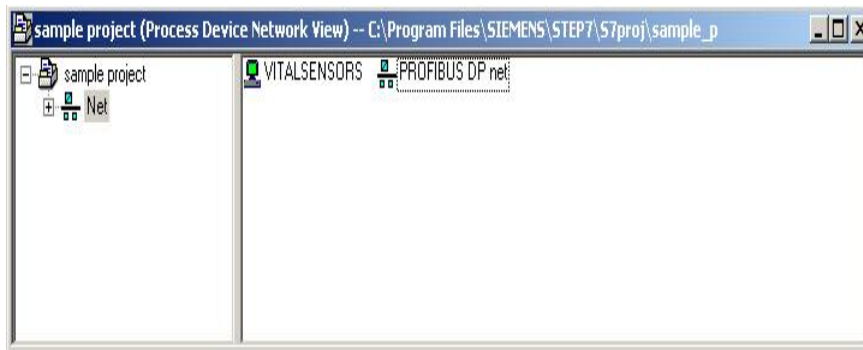
1. Launch **SIMATIC manager**.
2. Select **FILE/NEW** to open the New Project window and enter the project name.



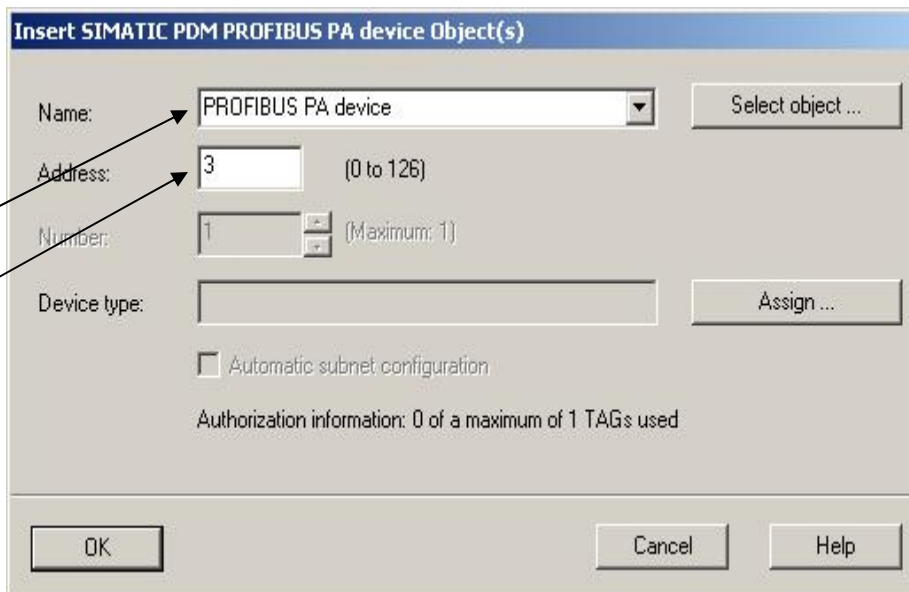
3. Click **OK** to open the **Sample Project** window.  
project name



4. Right-click **Net** and select **Insert New Object/PROFIBUS DP net**.

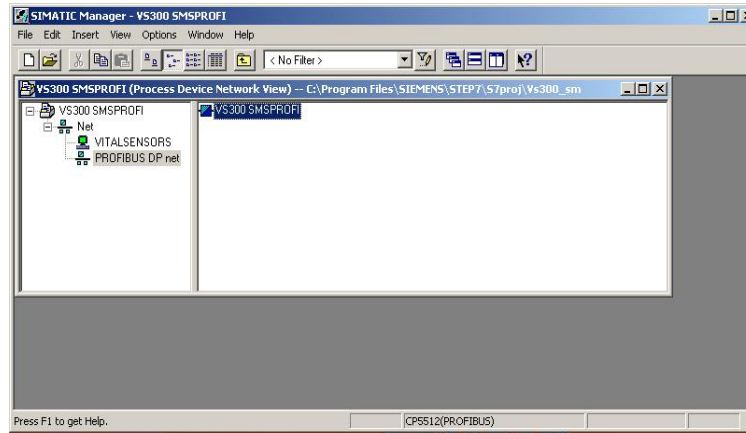


5. Right-click PROFIBUS DP net and select Insert New Object/PROFIBUS PA device.



NOTE: The address here must match the address in the device. See the Instruction Manual for details.

6. Click OK to re-open **Process Device Network View** window.



7. Double click the instrument to open the User ID window.
8. Select Specialist and click OK.

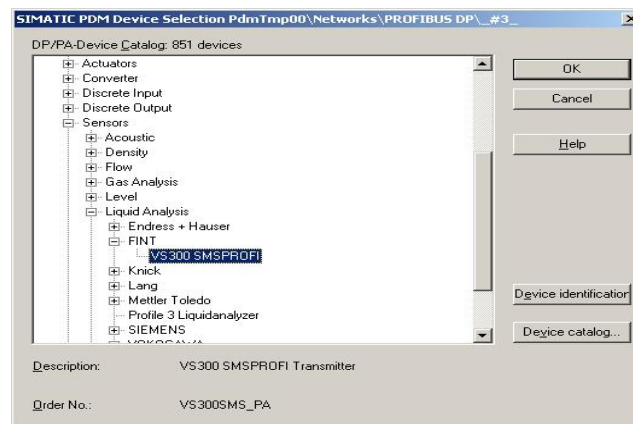


## Data display

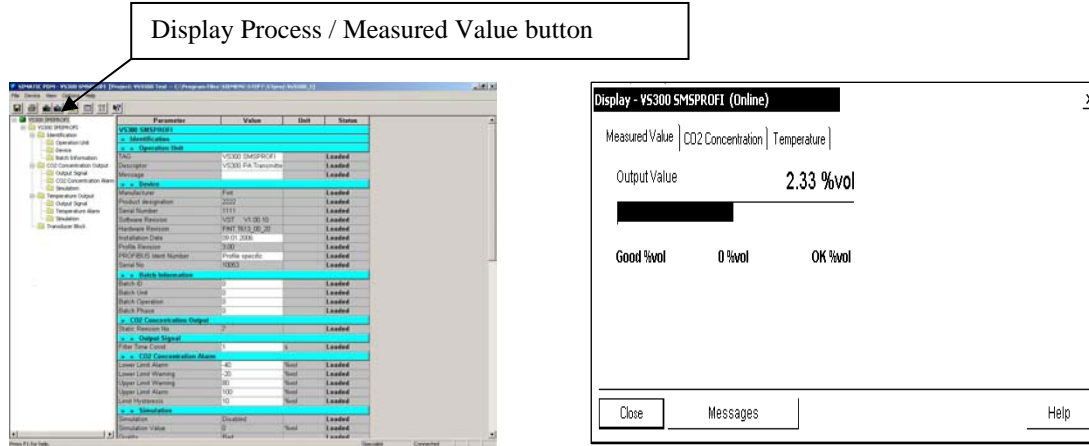
The next steps depend on the type of instrument being configured.

For the VitalSensors VS-300 SMS instrument:

1. Go to **Sensors/Liquid Analysis/Fint/VS300 SMSPROFI**.
2. Double-click the **VS300 SMSPROFI** device to open the device window.



Click Display Process/Measured Value button to connect to the instrument and display real time information.



## Viewing and editing parameters and application review

SIMATIC PDM provides full access to the instrument's parameters and to PDM's features. The parameters used to operate the instrument are accessed through the folder tree in the left pane of the Project Manager window. The PDM application review features are accessed through the Project Manager Window menu bar.

### Parameter viewing and editing

- Active fields are white; static fields are gray.
- Basic, detailed, and quick setup information is available.
- Review features give parameter setting overview.
- Whenever possible use drop down arrows to select values.
- Use upload and download buttons to change device settings and to store accumulated application data.

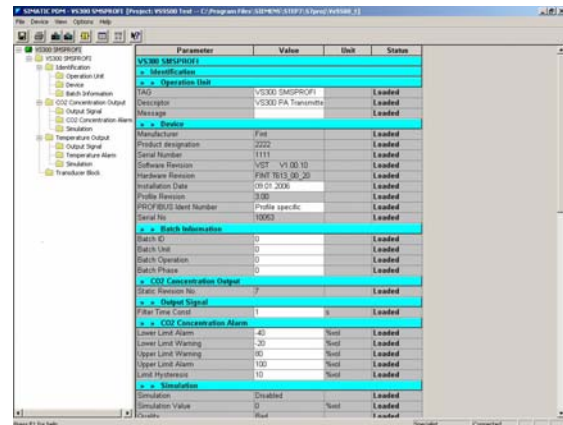
### Application review features

Use Menu bar features, including the following, to access application data and adjust the instruments performance:  
 Display Process / Measured Value button

- upload to PC/PG
- download to device
- set address
- master reset
- write locking
- sensor test
- simulation

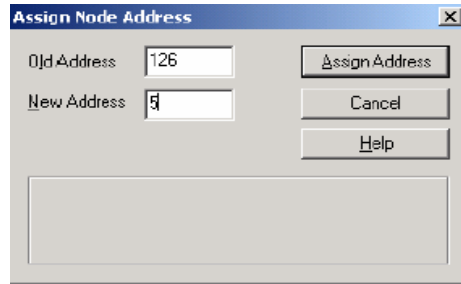
menu bar

parameter viewing and editing



**To change Address:**

1. Click **Device/Set Address**.



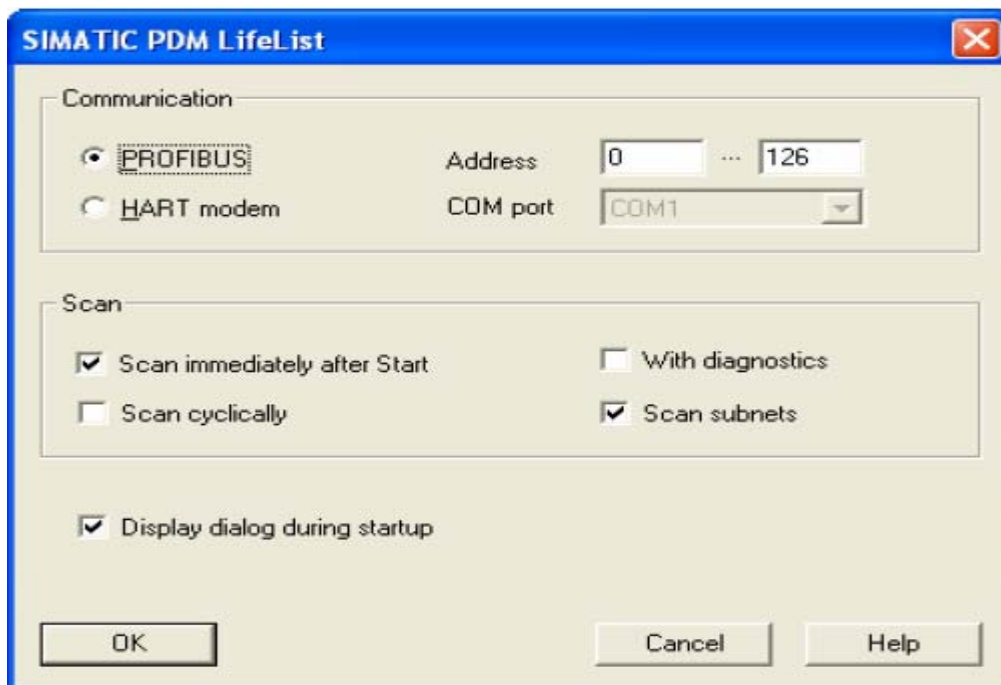
2. Enter new address value and click **Assign Address**.

**Note:** The Profibus device address can also be changed through the VS-300 Sensor Management Console software as described in the system manual or the Push Buttons. To use the Push Buttons use the “F” button to scroll to “Profibus Address” then use “+” or “-“ buttons to scroll to an address and follow the instructions.

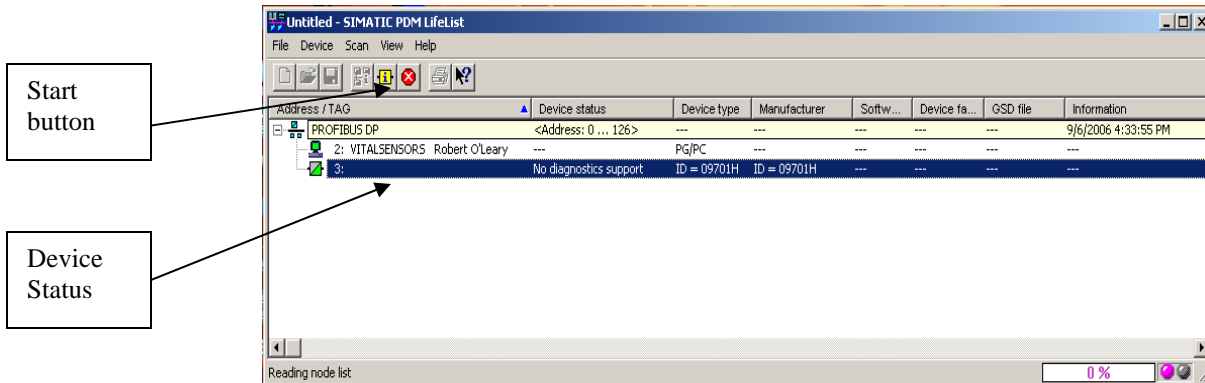
## SIMATIC PDM LifeList access

PDM LifeList gives immediate access to the instruments connected to the terminal. Any changes made to parameters can be saved upon exit and used to alter settings after PDM is launched.

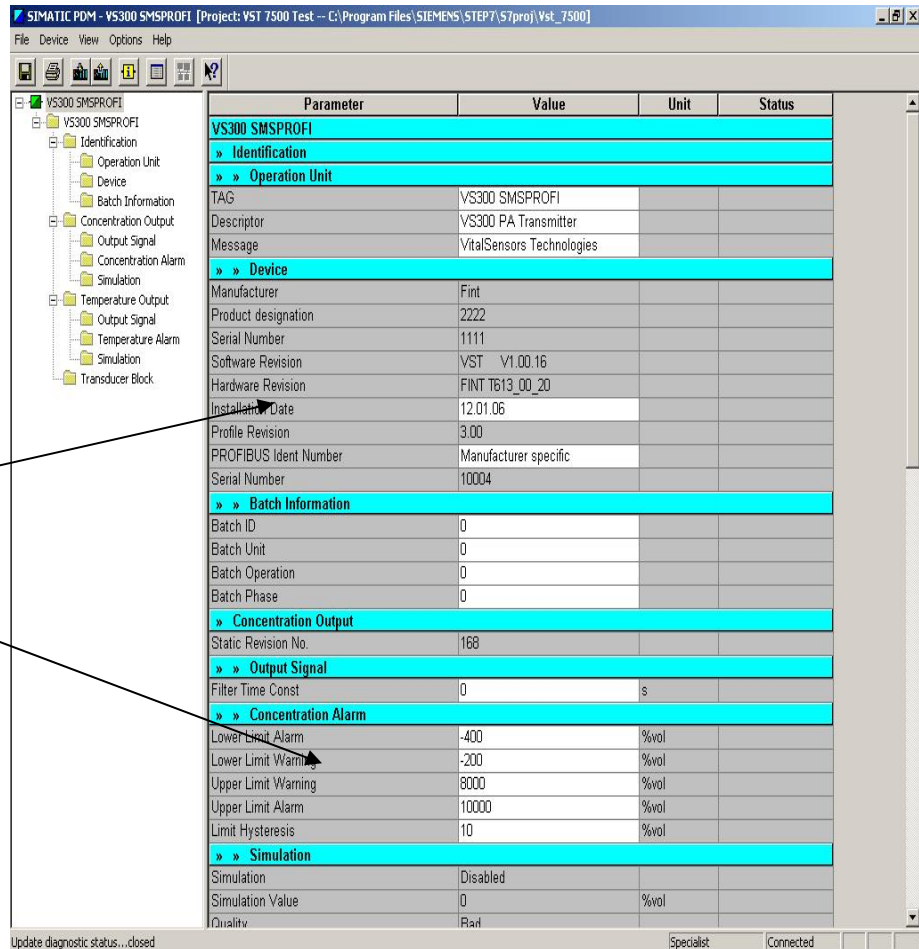
1. In the SIMATIC program folder, select **Step 7** and then click **SIMATIC PDM – LifeList** to select the communication device.
2. In the LifeList setup window, select the following:
  - PROFIBUS
  - Scan subnets



3. Click **OK** to open the access window.
4. Click the **Start** button (fourth from right) to access SITRANS CLS 200.
5. The Device status will be displayed as **Not Validated** and will remain so until the PDM has been launched and the project has been saved.



6. Double click on the instrument's icon to open the User ID box.
7. Select **Specialist**.
8. Click **OK** to open the instrument's **Temporary Project** window.



Right click on any parameter for help and range.  
To change parameter type in white space.

9. Open the instrument's folder in the left pane and select the parameter values requiring adjustment.
10. Use the Menu options to access application data and to adjust the instrument's performance.
11. Use the **Upload** and **Download** buttons to configure the unit and to get data.

Download to device

Upload to PG/PC

Parameter	Value	Unit	Status
<b>VS300 SMSPROFI</b>			
» Identification			
» » Operation Unit			
TAG	VS300 SMSPROFI		
Descriptor	VS300 PA Transmitter		
Message	VitalSensors Technologies		
» » Device			
Manufacturer	Fint		
Product designation	2222		
Serial Number	1111		
Software Revision	VST V1.00.16		
Hardware Revision	FINT T613_00_20		
Installation Date	12.01.06		
Profile Revision	3.00		
PROFIBUS Ident Number	Manufacturer specific		
Serial Number	10004		
» » Batch Information			
Batch ID	0		
Batch Unit	0		
Batch Operation	0		
Batch Phase	0		
» Concentration Output			
Static Revision No.	168		
» » Output Signal			
Filter Time Const	0	s	
» » Concentration Alarm			
Lower Limit Alarm	-400	%vol	
Lower Limit Warning	-200	%vol	
Upper Limit Warning	8000	%vol	
Upper Limit Alarm	10000	%vol	
Limit Hysteresis	10	%vol	
» » Simulation			
Simulation	Disabled		
Simulation Value	0	%vol	
Quality	Bad		

12. Click **File** and then **Exit** to close the LifeList window.
13. The data may now be saved and imported into a project file.

## View of VS300 SMSPROFI Device and Parameters

Parameter	Value	Unit	Status
<b>VS300 SMSPROFI</b>			
» Identification			
» » Operation Unit			
TAG	VS300 SMSPROFI		
Descriptor	VS300 PA Transmitter		
Message	VitalSensors Technologies		
» » Device			
Manufacturer	Fint		
Product designation	2222		
Serial Number	1111		
Software Revision	VST V1.00.16		
Hardware Revision	FINT T613_00_20		
Installation Date	12.01.06		
Profile Revision	3.00		
PROFIBUS Ident Number	Manufacturer specific		
Serial Number	10004		
» » Batch Information			
Batch ID	0		
Batch Unit	0		
Batch Operation	0		
Batch Phase	0		
» Concentration Output			
Static Revision No.	168		
» » Output Signal			
Filter Time Const	0	s	
» » Concentration Alarm			
Lower Limit Alarm	-400	%vol	
Lower Limit Warning	-200	%vol	
Upper Limit Warning	8000	%vol	
Upper Limit Alarm	10000	%vol	
Limit Hysteresis	10	%vol	
» » Simulation			
Simulation	Disabled		
Simulation Value	0	%vol	
Quality	Bad		

On this screen only Concentration Alarm limits can be changed

Like wise Temperature Alarms can also be set (the temperature alarm parameters are not pictured above)

## View of VS300 SMSPROFI Device and Parameters

Parameter	Value	Unit	Status
Upper Limit Warning	200	°F	
Upper Limit Alarm	300	°F	
Limit Hysteresis	10	°F	
<b>» » Simulation</b>			
Simulation	Disabled		
Simulation Value	0	°F	
Quality	Bad		
<b>» Transducer Block</b>			
Static Revision No.	0		
Concentration	3.23	%vol	
Quality	Good		
Concentration Unit	%vol		
Temperature	79.86	°F	
Quality	Good		
Temperature Unit	°F		
Averaging Time	60	[Sec]	
Threshold to Reset Averaging	10		
General Concentration Gain	1		
General Concentration Offset	0	%vol	
General Temperature Offset	0	°F	
Product Concentration Offset	0		
Field Calibrate: Concentration Gain	1		
Field Calibrate: Concentration Offset	0	%vol	
Field Calibrate: Temperature Gain	1		
Field Calibrate: Temperature Offset	0	°F	
Auxiliary Parameter 1	0		
Auxiliary Parameter 2	0		
Auxiliary Parameter 3	0		
Auxiliary Parameter 4	0		
Auxiliary Parameter 5	0		
Auxiliary Parameter 6	0		
Auxiliary Parameter 7	0		
Sensor Type	4		
Serial Number	10004		

### Acyclic Parameters and Services – for system maintenance

- **General Concentration Gain:** multiplier for concentration value of all products
- **General Concentration Offset:** added to concentration value of all products
- **General Temperature Offset:** added to temperature value of all products
- **Product Concentration Offset:** added to concentration value of a single product
- **Field Calibrate: Concentration Gain:** multiplier for concentration value of all products (**set once**)
- **Field Calibrate: Concentration Offset:** added to concentration value of all products (**set once**)
- **Field Calibrate: Temperature Gain:** multiplier for temperature values of all products (**set once**)
- **Field Calibrate: Temperature Offset:** added to temperature value of all products (**set once**)
- **Auxiliary Parameters:** 1-7 are reserved for future use

## Sensor Type

VS-1000 Sensors are automatically queried by the VS-300 Sensor Management Station for sensor type. This data is automatically provided to Simatic PDM on acyclic data uploads. The various VS-1000 Sensor Types are the following:

- Sensor Type = 1 is a CO2 sensor
- Sensor Type = 2 is a CO2 sensor
- Sensor Type = 3 is a Brix sensor
- Sensor Type = 4 is an Ethanol/Alcohol sensor
- Sensor Type = 20 is a CO2 sensor
- Sensor Type = 30 is a Brix sensor
- Sensor Type = 40 is an Ethanol/Alcohol sensor
- Sensor Type = 50 is an Acid sensor

## Instrument Cyclic Data Communication

Cyclic communication is the simple exchange of **real-time** user data via the Profibus data exchange telegram. **Time critical** process data are exchanged between a class – 1 master and the VS-300 SMSPROFI Transmitter. The data includes **temperature, concentration, controller** and **status information**.

The time critical parameters are viewable in the PLC master and Simatic PDM. These time critical parameters are the main values provided by the instrument and cannot be changed except for the unit type that is displayed.

## Instrument Acyclic Data Communication – DP-V1 Services

The acyclic data exchange is a Profibus DP-V1 service for the transmission of new parameter jobs for **controlling** and **monitoring** the VS-1000 Sensor System through its VS-300 SMSPROFI Transmitter parallel to true cyclic communications. Presently acyclic communications with the VS-1000 Sensor System is only possible through the use of Simatic PDM services and the VitalSensors provided DDL files.

Acyclic communications on the VS-1000 Sensor System is typically used at the time of Field Commissioning of the instrument and on-going maintenance. Maintenance of the instrument will typically involve the transferring to the instrument gains and offsets if and when required. The checking of instrument parameters is typically a weekly or every two week effort when in a production environment.

The **Acyclic Parameters and Services – for system maintenance** are shown on the previous page.

## Error Codes of the DP-V1 Services

This table shows possible error codes of DP-V1 services that may occur in the event an error in the communication on DP-V1 telegram level

Error_Class (from DP-V1 Specifications)	Error_Code (from DP-V1 specification)	DP-V1 parameter channel
0x0...0x9 = hex reserved		
0xA = application	0x0 = read error 0x1 = write error 0x2 = module error 0x3 to 0x7 = reserved 0x8 = version conflict 0x9 = feature not supported 0xA to 0xF = user specific	
0xB = access	0x0 = invalid index	0xB0 = No data block index (DB47); parameter requests not supported
	0x1 = write length error 0x2 = invalid slot 0x3 = type conflict 0x4 = invalid area	Inadmissible data set lengths with the writing Inadmissible slot Type conflict (false sequential number) Faulty data area
	0x5 = state conflict	0xB5 = Access to DB47 temporarily not possible due to internal processing status
	0x6 = access denied	False authorization level
	0x7 = invalid range	Inadmissible length with reading
	0x8 = invalid parameter 0x9 = invalid type 0xA to 0xF = user specific	Values for register not allowed
0xC = resource	0x0 = read constraint conflict 0x1 = write constraint conflict 0x2 = resource busy 0x3 = resource unavailable 0x4..0x7 = reserved 0x8..0xF = user specific	





## Certificate

PROFIBUS Nutzerorganisation e.V. grants to  
**VitalSensors Technologies LLC**  
**3 Post Office Square, 2nd; 01720 Acton, MA, USA**  
 the Certificate No.: **Z01226** for the PROFIBUS Slave:

**Product Name:** VS300 SMSPROFI  
**Revision:** 1; SW/FW: VST V.1.00.17; HW: FINT  
 T613\_00\_20  
**GSD:** VS300A28.gsd; File Version: 3.0 (violet)

This certificate confirms that the product has successfully passed the certification tests with the following scope:

<input checked="" type="checkbox"/>	DP V0	MS0, Sct_Slave_Adc
<input checked="" type="checkbox"/>	DP V1	MS2
<input type="checkbox"/>	DP V2	
<input checked="" type="checkbox"/>	Profile	PA Devices V 3.0
<input checked="" type="checkbox"/>	Physical Layer	MBP

Test Report Number: **PCN084-PAS-01**  
 Authorized Test Laboratory: **PROCENEC, Wateringen, Netherlands**  
 Expiry date of Certificate: **November 16, 2009**

The tests were executed in accordance with the following documents:  
 "Test Specifications for PROFIBUS DP Slaves, Version 3.0 from November 2005"  
 and "Test Specification for PROFIBUS PA Profile 3.0, Version 4.1, Nov. 2004"  
 This certificate is granted according to the document "Framework for testing and certification of PROFIBUS products".

Karlsruhe, January 25, 2007



*[Signature]*  
 (Official In Charge)

Board of PROFIBUS Nutzerorganisation e. V.

*[Signature]* (E. Küster)      *[Signature]* (K.-P. Lindner)