

2.2.5 VitalSensors VS-3000 Sensor System – ProfibusDP Fieldbus Setup

Objective

- Integrate *VS-3000 Sensor System* to Siemens PLC network via PROFIBUS-DP
- Implement automatic brand/product selection
- Implement flow stop/start
- Send measured process variables to PLC

Equipment

- Remote Network Access to *VS-3000 Dashboard User Interface*
 - ProfibusDP compatible master PLC
 - ProfibusDP cable
 - PLC software
 - *VS-3000 Compact GSD File*
-

While every effort was made to verify the following information, no warranty of accuracy or usability is expressed or implied.

Note: The complete system is referred to as the *VS-3000 Sensor System*. The *VS-300 Sensor Management Station (SMS)* and *VS-3000 Dashboard Software* are sub-components.

The VS-3000 Dashboard Software runs on the windows platform of the *VS-300 Sensor Management Station (SMS)*. *VS-3000 Dashboard Software* controls all measurement and PLC communications.

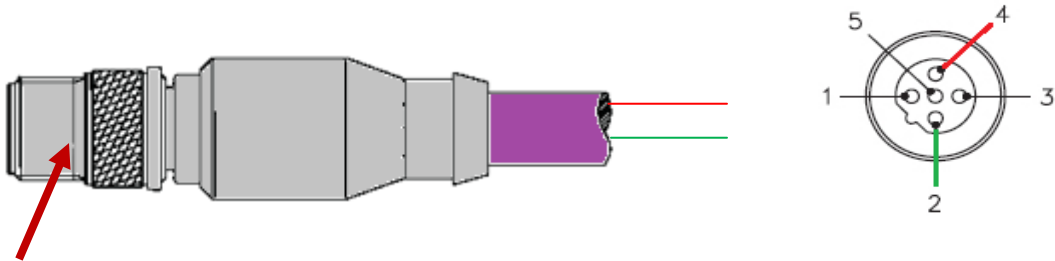
Overview

The purpose of this document is to ensure proper configuration of *VS-3000 Sensor System* and Siemens PLC for bi-directional communication via ProfibusDP.

This Application Guide assumes familiarity with *VS-3000 Dashboard Software* and the methods for logging in with Remote Desktop Connection. For more information on this functionality see Tech Note 9.1

Initial setup of VS-300 SMS and VS-3000 Dashboard for ProfibusDP

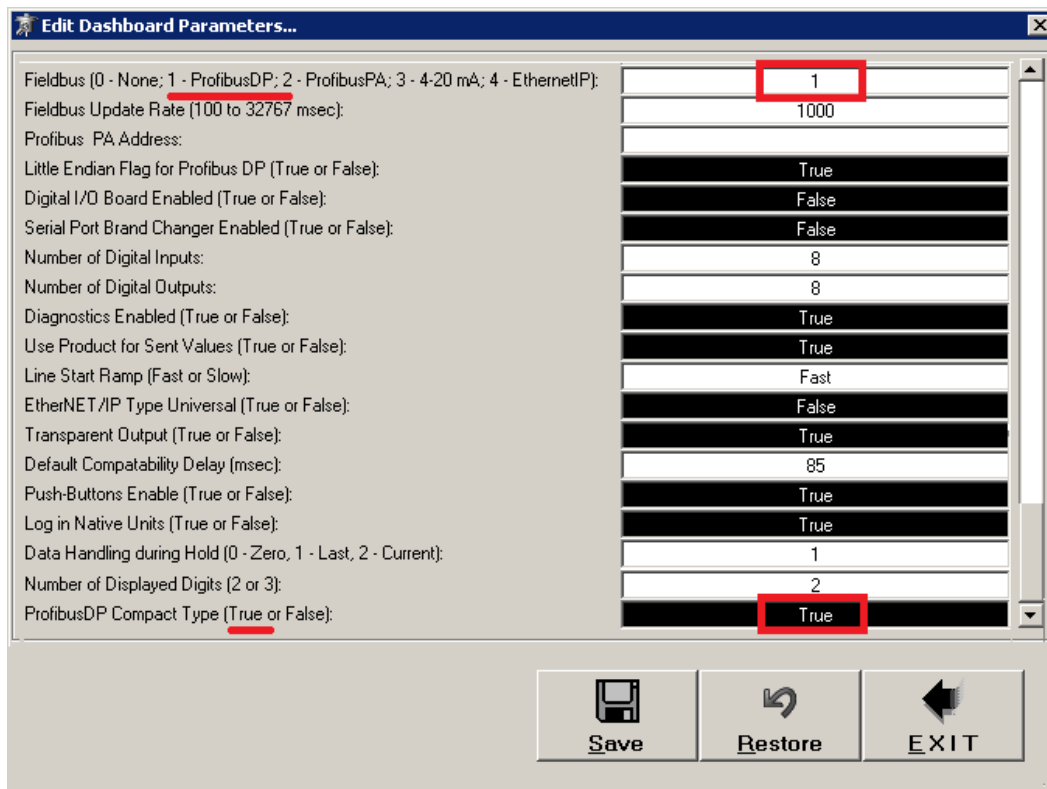
1. Connect ProfibusDP cable between VS-300 SMS and Siemens PLC. The connector is provided with your VS-3000 Sensor System (Turck BMSWS 8151-0/PG).
 - a. The connection port on the VS-300 SMS is marked **FIELDBUS**. It is located toward the right side of the VS-300 SMS bottom bulkhead.



Turck BMSWS 8151-0/PG 9 connector (supplied)

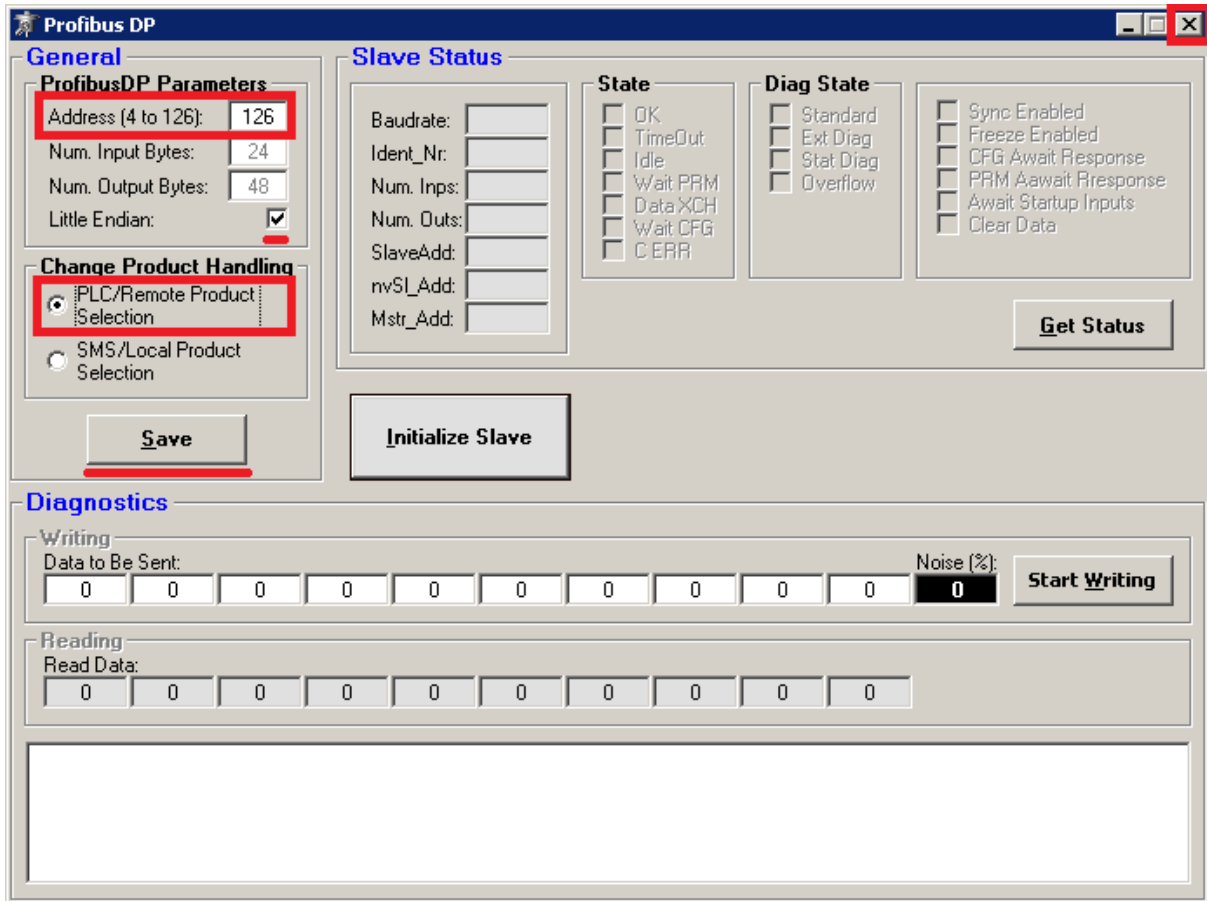
Pin 2 = **Data Core A (Green Wire)**
 Pin 4 = **Data Core B (Red Wire)**
 Pin 1, 3, 5= Not Connected

2. Log into the VS-300 SMS and VS-3000 Dashboard Software with Remote Desktop Connection
3. Go to EDIT >> DASHBOARD PARAMETERS, confirm the two settings in the **RED** boxes

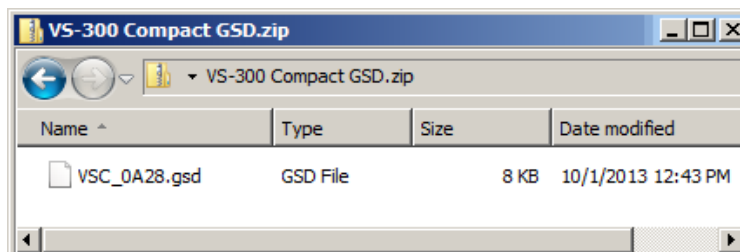


- a. Click **SAVE** then **EXIT** (VS-3000 Dashboard will re-start, this takes 30 seconds)

4. Go to **EDIT >> PROFIBUS DP**. *ProfibusDP Address* for the *VS-300 SMS* must be set to match the desired device location/address in the Siemens PLC.
 - a. Unless pre-defined at time of shipment, the *VS-300 SMS* has a default *ProfibusDP Address* of **126**.
 - b. Confirm **Little Endian** is “checked”
 - c. Confirm **PLC/Remote Product Selection**
 - d. Click **Initialize Slave** and then click **SAVE**



5. Close and Re-Launch *VS-3000 Dashboard*
6. Install the **VS-3000 Compact GSD** file on Siemens PLC. The actual GSD filename is *VSC_0A28.gsd*.
 - a. The GSD file is provided on the *VS-3000 Documentation CD* or via e-mail in a .zip folder



Implementing Input and Output Data Tables

NOTE: Your *VS-3000 Sensor System* will only output the parameters you have purchased to the PLC. These settings are defined at the VitalSensors factory.

All PLC values are 4-byte, **FLOATING POINT** numbers. For the German version of Siemens software, **FLOATING POINT** data types are called **GLEITPUNKT**.

The **BIT/WORD Display Format** for values are as follows:

- *VS-300 SMS* to Siemens PLC = **PID**. For the German version of Siemens, PID is called **PED**
- Siemens PLC to *VS-300 SMS* = **PQD**. For the German version of Siemens, PQD is called **PAD**
- 13x 4-byte words for *VS-300 SMS* to PLC 7x 4-byte words for PLC to *VS-300 SMS*
- All signals from PLC to *VS-300 SMS* must be **FLOATING POINT** format (ie. 0.0, 5.0, 100.0)

VS-3000 Beer, Wine and Fermentation Monitor -- Input and Output Descriptions (English)

VS-300 SMS to Siemens PLC			
#	Description	Bit	Display Format
0	Watchdog / Heartbeat (random integer)	PID +0	FLOATING_POINT
1	Alcohol (%w/w) or (%m/m)	PID +4	FLOATING_POINT
2	Real Extract (°Plato) or (%m/m)	PID +8	FLOATING_POINT
3	CO2	PID +12	FLOATING_POINT
4	---	PID +16	FLOATING_POINT
5	Product Temperature (°C or °F)	PID +20	FLOATING_POINT
6	---	PID +24	FLOATING_POINT
7	Specific Gravity	PID +28	FLOATING_POINT
8	Original Gravity (OG °Plato)	PID +32	FLOATING_POINT
9	Real Degree of Fermentation	PID +36	FLOATING_POINT
10	Alcohol (% v/v)	PID +40	FLOATING_POINT
11	Product ID # (ReadBack verification)	PID +44	FLOATING_POINT
12	---	PID +48	FLOATING_POINT
Siemens PLC to VS-300 SMS			
#	Description	Bit	Display Format
0	Global Send Enable (always set to "1.0")	PQD +0	FLOATING_POINT
1	Product ID - Send Enable (always set to "1.0")	PQD +4	FLOATING_POINT
2	Product ID (high) (usually set to "0.0")	PQD +8	FLOATING_POINT
3	Product ID (low) (number, 1.0, 5.0, etc)	PQD +12	FLOATING_POINT
4	Flow Signal (1.0 = no flow (default), 0.0 = flow)	PQD +16	FLOATING_POINT
5	---	PQD +20	FLOATING_POINT
6	---	PQD +24	FLOATING_POINT

VS-3000 Beer, Wine and Fermentation Monitor - Input and Output Descriptions (Deutsche)

VS-300 SMS zu Siemens PLC			
#	Beschreibung	Bit	Anzeigeformat
0	Herzschlag / Watchdog (random integer)	PED +0	GLEITPUNKT
1	Alkohol (% w/w) oder (% m/m)	PED +4	GLEITPUNKT
2	Echt Extrakt (°Plato) oder (% w/w) oder (% m/m)	PED +8	GLEITPUNKT
3	CO₂	PED +12	GLEITPUNKT
4	---	PED +16	GLEITPUNKT
5	Produkt Temperatur	PED +20	GLEITPUNKT
6	---	PED +24	GLEITPUNKT
7	Specific Gravity	PED +28	GLEITPUNKT
8	Stammwuerze / OG (°Plato)	PED +32	GLEITPUNKT
9	Echtvergärungsgrad	PED +36	GLEITPUNKT
10	Alkohol (%v/v)	PED +40	GLEITPUNKT
11	Produktnummer (#) (Rücklese Überprüfung)	PED +44	GLEITPUNKT
12	---	PED +48	GLEITPUNKT
Siemens PLC zu VS-300 SMS			
#	Beschreibung	Bit	Anzeigeformat
0	(immer auf "1.0" gesetzt)	PAD +0	GLEITPUNKT
1	(immer auf "1.0" gesetzt)	PAD +4	GLEITPUNKT
2	(in der Regel auf "0.0" gesetzt)	PAD +8	GLEITPUNKT
3	Produktnummer (niedrig) (nummer)	PAD +12	GLEITPUNKT
4	Fluss Signa (1.0 = kein durchfluss, 0.0 = fluss)	PAD +16	GLEITPUNKT
5	---	PAD +20	GLEITPUNKT
6	---	PAD +24	GLEITPUNKT

VS-3000 Beer, Wine and Fermentation Monitor -- Input and Output Descriptions (Español)

VS-300 SMS a PLC			
#	Descripcion	Bit	Typo
0	Watchdog	PID +0	FLOATING_POINT
1	Alcohol (p/p)	PID +4	FLOATING_POINT
2	Extracto Real (p/p)	PID +8	FLOATING_POINT
3	CO2 (g/L)	PID +12	FLOATING_POINT
4	---	PID +16	FLOATING_POINT
5	Temperatura de la Cerveza (C o F)	PID +20	FLOATING_POINT
6	---	PID +24	FLOATING_POINT
7	Gravedad Específico	PID +28	FLOATING_POINT
8	Gravedad Original (OG °Plato)	PID +32	FLOATING_POINT
9	RDF	PID +36	FLOATING_POINT
10	Alcohol (v/v)	PID +40	FLOATING_POINT
11	Current Product ID # (ReadBack)	PID +44	FLOATING_POINT
12	---	PID +48	FLOATING_POINT
PLC a VS-300 SMS			
#	Descripcion	Bit	Typo
0	Global Send Enable (siempre "1.0")	PQD +0	FLOATING_POINT
1	Product ID - Send Enable (siempre "1.0")	PQD +4	FLOATING_POINT
2	--- (siempre "0.0")	PQD +8	FLOATING_POINT
3	Producto ID (numero)	PQD +12	FLOATING_POINT
4	Line Stop (1.0 = no flujo [defaulto], 0.0 = flujo)	PQD +16	FLOATING_POINT
5	---	PQD +20	FLOATING_POINT
6	---	PQD +24	FLOATING_POINT

VS-3000 Soft Drink Monitor -- Input and Output Descriptions (English)

<i>VS-300 SMS to Siemens PLC</i>			
#	Description	Bit	Display Format
0	Watchdog (random integer)	PID +0	FLOATING_POINT
1	Brix	PID +4	FLOATING_POINT
2	Acid	PID +8	FLOATING_POINT
3	CO2	PID +12	FLOATING_POINT
4	---	PID +16	FLOATING_POINT
5	Fluid Temperature	PID +20	FLOATING_POINT
6	---	PID +24	FLOATING_POINT
7	---	PID +28	FLOATING_POINT
8	Assay	PID +32	FLOATING_POINT
9	---	PID +36	FLOATING_POINT
10	---	PID +40	FLOATING_POINT
11	Current Product ID # (ReadBack)	PID +44	FLOATING_POINT
12	Acid (% of Target)	PID +48	FLOATING_POINT
<i>Siemens PLC to VS-300 SMS</i>			
#	Description	Bit	Display Format
0	Global Send Enable <i>(always set to "1.0")</i>	PQD +0	FLOATING_POINT
1	Product ID - Send Enable <i>(always set to "1.0")</i>	PQD +4	FLOATING_POINT
2	Product ID (high) <i>(usually set to "0.0")</i>	PQD +8	FLOATING_POINT
3	Product ID (number)	PQD +12	FLOATING_POINT
4	Flow Status <i>(1.0 = no flow [default], 0.0 = flow)</i>	PQD +16	FLOATING_POINT
5	---	PQD +20	FLOATING_POINT
6	---	PQD +24	FLOATING_POINT

PLC Programming:

VS-300 SMS outputs to Siemens PLC

The programming to set up communications between VS-300 SMS and Siemens PLC is minimal. Once the VS-300 SMS device is loaded into the process “tree” the VS-300 SMS automatically sends the process variables to the PLC. No instructions to “pull data” from the VS-300 SMS are required.

The following screenshot shows Siemens S7 PLC setup. This diagram assumes that VS-300 SMS has been set to ProfibusDP Address 5 as an example.

The screenshot shows the SIMATIC Manager HW Config interface. On the left, a hardware rack is shown with slots 1 through 6. Slot 5 contains a VS-300 SMS device, which is highlighted with a red box. The device is connected to a PROFIBUS DP master system. On the right, the device tree shows the VS-300 SMS device under the PROFIBUS DP section, also highlighted with a red box. Below the rack, a table lists the device's I/O addresses.

Slot	DP ID	...	Order Number / Designation	I Address	Q Address	Comment
0	16A/		V244 In, 160 Out	256...287		
1	16A/		V244 In, 160 Out	288...319		
2	16A/		V244 In, 160 Out	320...351		
3	16A/		V244 In, 160 Out	352...383		
4	16A/		V244 In, 160 Out	384...415		
5	16A/		V244 In, 160 Out	416...447		
6	16A/		V244 In, 160 Out	448...479		
7	10A/		V244 In, 160 Out	480...499		
8	16A/O		V244 In, 160 Out		256...287	
9	16A/O		V244 In, 160 Out		288...319	
10	16A/O		V244 In, 160 Out		320...351	
11	16A/O		V244 In, 160 Out		352...383	
12	16A/O		V244 In, 160 Out		384...415	

In the above case, the user configured the VS-300 SMS to PLC Bits 256 to 304

Recall there are 13x 4-byte words for VS-300 SMS outputs to PLC

A sample process variable tree is shown at right (for VS-300 SMS outputs to PLC)

Note: the Display Format is FLOATING_POINT

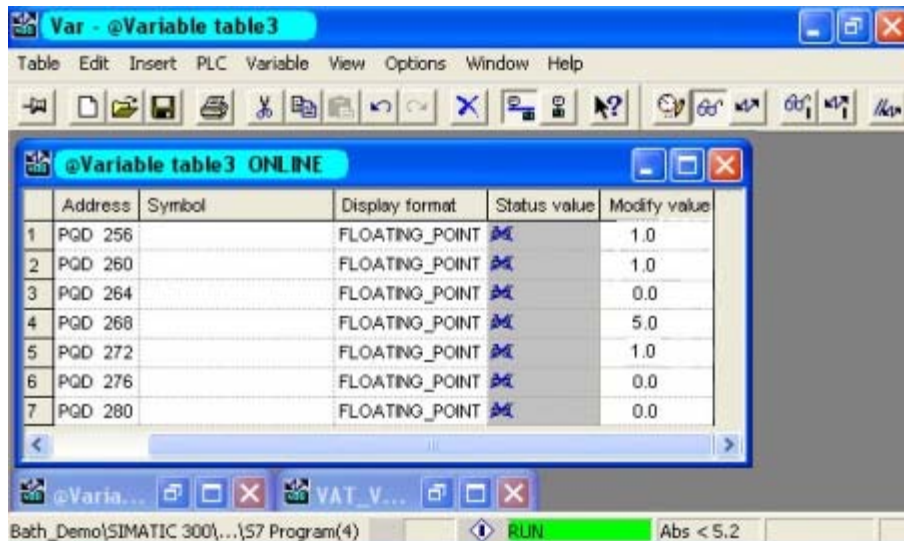
The screenshot shows the SIMATIC Manager Variable table for the VS-300 SMS outputs. The table lists 13 process variables, each with a PID, address, symbol, display format, status value, and modify value.

	Address	Symbol	Display format	Status value	Modify value
1	PID 256		FLOATING_POINT	4429.0	
2	PID 260		FLOATING_POINT	13.8687	
3	PID 264		FLOATING_POINT	6.7615	
4	PID 268		FLOATING_POINT	3.592	
5	PID 272		FLOATING_POINT	24.993	
6	PID 276		FLOATING_POINT	24.991	
7	PID 280		FLOATING_POINT	0.0	
8	PID 284		FLOATING_POINT	0.0	
9	PID 288		FLOATING_POINT	0.0	
10	PID 292		FLOATING_POINT	0.0	
11	PID 296		FLOATING_POINT	0.0	
12	PID 300		FLOATING_POINT	1.09	
13	PID 304		FLOATING_POINT	9.3	

Siemens PLC outputs to VS-300 SMS

In the case below, the user configured Siemens PLC outputs to VS-300 SMS in **Bits 256 to 280**

- Note: the *Display Format* is **FLOATING_POINT**
- Recall there are 7x, 4-byte words for Siemens PLC Outputs to VS-300 SMS



The second part of the programming is to write a simple ladder diagram Siemens PLC outputs to VS-300 SMS.

- At the start of each run, send the Brand/Product number to **PQD +12** (268 in example above)
 - o Brand / Product numbrt must be sent in FLOATING POINT format (ie. **5.0, 15.0, 100.0**)
 - o Send the value continuously until the next Brand/Product starts
 - o PQD = PAD for German version of Siemens software
- When the line is flowing, send a “**0.0**” to address **PQD +16** (272 in example above)
 - o else keep “1.0” as default value
 - o PQD = PAD for German version of Siemens software
- Always send “**1.0**” to **PQD +0** (256 in example above)
 - o PQD = PAD for German version of Siemens software
- Always send “**1.0**” to **PQD +4** (260 in example above)
 - o PQD = PAD for German version of Siemens software
- Always send “**0.0**” to **PQD +8** (264 in example above)
 - o PQD = PAD for German version of Siemens software

Reference: Compact GSD File – VSC_0A28

```

;*****
; GSD-File for VitalSensors DP-Slave PROFIboard (ISA, PCI) / PROFI104
; Date   : 01-January-2012
; Revision: V1.2
;*****
;
; This GSD-File is supplied with Softings DP-Slave (DPS).
; It represents a generic DP-Slave which should be suitable for most of
; the applications. It is not allowed to modify this file.
;
; ATTENTION: Any changes to this GSD-file will invalidate the certification
;             of the DP-Slave!
;             However, you can create your own GSD-File if you have applied
;             for your own PNO Ident_Number. In that case use this file
;             as template and make your necessary changes in the copy.
;             Places where you can make your changes are marked with the
;             'CHANGE HERE' statement.
;*****
;
#Profibus_DP
GSD_Revision      = 2                ; DPV1
;
;- Text Lists -----
;
; *** CHANGE HERE ***
; *** if you want to use extended parameters with symbolic names ***
; *** Example: ***
; *** PrmText=1 ***
; *** Text(0)="disable" ***
; *** Text(1)="enable" ***
;
;- Extended User Prm Data List -----
;
; *** CHANGE HERE ***
; *** if you want to use extended parameters ***
; *** Example: ***
; *** ExtUserPrmData=1 "Diagnostics Alarm" ***
; *** Bit(5) 1 0-1 ***
; *** Prm_Text_Ref=1 ***
; *** EndExtUserPrmData ***
;
;- Common Declarations -----
;
Vendor_Name      = "VitalSensors Technologies LLC"

```

```

Model_Name      = "VS300 Compact/PROFI104"
Revision        = "01"
Protocol_Ident  = 0
Station_Type    = 0
FMS_supp       = 0
Hardware_Release = "V 1.0"
Software_Release = "V 1.2"
Implementation_Type = "SPC3"
;
;- Ident Number -----
;
; *** CHANGE HERE ***
; *** If you want to user your own device number ***
; *** Any different ident number has to be requested from the ***
; *** PNO. 0xB205 is Softings Number for the slave. ***
; *** The number here has to be used in the slave application ***
; *** when calling <dps_init_slave>. ***
;
Ident_Number    = 0x0A28
;
;- Baudrates -----
;
9.6_supp       = 1
19.2_supp      = 1
31.25_supp     = 0
45.45_supp     = 1
93.75_supp     = 1
187.5_supp     = 1
500_supp       = 1
1.5M_supp      = 1
3M_supp        = 1
6M_supp        = 1
12M_supp       = 1
;
;- FDL-Bus-Parameter for supported baudrate -----
;
MaxTcdr_9.6    = 60
MaxTcdr_19.2   = 60
MaxTcdr_45.45  = 60
MaxTcdr_93.75  = 60
MaxTcdr_187.5  = 60
MaxTcdr_500    = 100
MaxTcdr_1.5M   = 150
MaxTcdr_3M     = 250
MaxTcdr_6M     = 450
MaxTcdr_12M    = 800
;
;- DP-Specific Parameters -----
;
Freeze_Mode_supp = 1
Sync_Mode_supp   = 1

```

```

Auto_Baud_supp    = 1
Set_Slave_Add_supp = 1
Min_Slave_Intervall = 1
Fail_Safe        = 1
Slave_Family     = 0                ; default family
;DPV1_Slave      = 0
;
;- Diagnostics -----
;
; *** CHANGE HERE                ***
; *** If you want to use extended diagnostics, increase ***
; *** this value to any number up to 244. The value has to be ***
; *** set in the slave application, service <dps_init_slave>. ***
;
Max_Diag_Data_Len = 32 ; application specific extended diagnostics
;
; *** CHANGE HERE
; *** if you want to put a special meaning to certain diagnostic bits
; *** Example:
; *** Max_Diag_Data_Len = 8
; *** Unit_Diag_Bit(0001)="External Power Failure"
;
;- Hardware Specific -----
;
Redundancy        = 0
Repeater_Ctrl_Sig = 2                ; TTL
24V_Pins          = 0                ; not available
;Physical_Layer   = 0                ; RS485
;
;- User Prm Data -----
;
; *** CHANGE HERE                ***
; *** if you want to use User Parameters ***
; *** Example (Emulation of a device with LSPM2-Profibus-ASIC): ***
; *** User_Prm_Data_Len = 05 ***
; *** User_Prm_Data = 0x00,0x00,0x00,0x00,0x00 ***
;
; *** User_Prm_Data_Len = <Your Number> ***
; *** This number has to be set also in the slave application, ***
; *** service <dps_init_slave>. ***
; *** The number of bytes provided in <User_Prm_Data> has ***
; *** to be exactly this number. ***
;
User_Prm_Data_Len = 0
;
;- Extended User Prm Data -----
;
; *** CHANGE HERE                ***
; *** if you want to use Extended User Parameters ***
; *** Max_User_Prm_Data_Len = <Your number> ***
; *** This number has to be set also in the slave application, ***

```

```

; *** service <dps_init_slave>.          ***
;
;
;- Modules -----
;
;Modular_Station    = 0
;Modul_Offset       = 1
;Max_Module         = 100                ; any number
;                                     ; restriction is cfg-len
;Max_Input_Len      = 244
;Max_Output_Len     = 160
;Max_Data_Len       = 404
;
;-----
;
; *** CHANGE HERE          ***
; *** e.g. add/delete/change modules      ***
; *** from here to the end of the file    ***
;
;-----
;
;- Configurations for VitalSensors device -----
Module = "48 In, 24 Out" 0x5F, 0x57, 0x6B
EndModule

;
;- EOF -----
;

```