Quick Start Guide to Profibus DP for the Servostar
S300/S400/S600/S700

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The purpose of this document is to provide just enough information to get Profibus communication working, set parameters, and move the motor. For more details, please see the manual.

Hardware
The Profibus option cards for the S300 and S600 are different:
S300 card is labeled "PROFIBUS DP" (OPTION=H0Cxx).
S400 does not require an option card.
S600 card is labeled "PROFIBUS" (OPTION=H02xx).
Connect the controller to the Profibus card using either connector X12A or X12B.

Communication Structure
The Profibus telegram consists of 28 bytes. The PKW (Parameter channel) is eight (8) bytes. The PZD (Data channel) is 20 bytes. The PKW is used to read/write drive parameter values. The PZD is used to execute higher speed data transfer to read/write predefined data, such as actual position and target position.

PKW:
       PKE – (bytes 1 – 2) Parameter ID
       IND – (byte 3) Index
       -- byte 4 is reserved (zero)
       PWE – (bytes 5 – 8) Parameter Value
PZD:
       PZD1: STW – (bytes 9 – 10) Control Word (Output from controller)
              ZSW – (bytes 9 – 10) Status Word (Input to controller)
       PZD2: HSW – (bytes 11 – 12) Main Setpoint (Output from controller)
              HIW – (bytes 11 – 12) Main Actual Value (Input to controller)
       PZD3: bytes 13 – 14
       PZD4: bytes 15 – 16
       PZD5: bytes 17 – 18
       PZD6: bytes 19 – 20
PZD7, 8, 9, and 10 are bytes 21 – 28. These are rarely used.

The Profibus screen in the GUI will display the data:
1. Output is data output from the controller to the drive.
2. Input is data input to the controller from the drive.

Communication
1. Enter PPO Type = 2.
2. The address is the drive address (ADDR), which can be set in the CAN/Fieldbus section of the GUI. The controller must be set to communicate with this drive address.
3. The Baud rate is set by the controller automatically.

1 byte = 8 bits = 2 Hex digits. So each PKW and PZD is 2 bytes = 16 bits = 4 Hex digits.

PKW (Parameter Channel)

Read / Write Drive Parameters

PKE = 1xxx for read and 3xxx for write, where xxx is the 3-digit hex value of the parameter ID. The "1" and "3" register on the *transition to these values*.

Look up the drive parameter in the Profibus manual, or in the ASCII.chm reference guide and find the Profibus PNU and the IND number. PNU numbers 1600 and above will have IND=1 (0100 hex).

Response to Controller

The read/write response will be PKE = 2xxx for successful, and 7xxx for unsuccessful. A successful read response will contain the actual value (in hex) of that parameter in the PWE.

Example: GV, Profibus PNU = 1672 (dec), IND = 1 (dec).
1672 (dec) = 688 (hex)
1. To read GV, set PKE = 0688 (hex), IND = 0100 (hex), and PWE = 00000000 (hex).
2. Then change the first digit of PKE from 0 to 1 (for a read).
3. The response should be PKE = 2688 (hex), IND = 0100 (hex), and PWE = XXXXXXXX (hex). Write down this value, so you can set it back later.
4. To write to GV, set PKE = 0688 (hex), IND = 0100 (hex), and PWE = 00000005 (hex) (the value you want to write).
5. Then change the first digit of PKE from 0 to 3 (for a write).
6. The response should be PKE = 2688 (hex), IND = 0100 (hex), and PWE = 00000005 (hex).
7. Set GV back to the previous value.

To issue an ASCII command, such as MH, EN, DIS, SAVE, COLDSTART, etc., enter it as if you are reading a parameter. These commands do not have values associated with them, so you can't write a value.

PZD (Process Data Channel)
The PZD has a fixed set of functionality. Each bit in the Control Word and Status Word has only one predetermined function that cannot be changed. PZD2-6 have fixed functionality base on the operation mode, and only slight variations can be made based on Bit 14 of the Control Word.

See the Profibus DP manual for PZD functions.

Enable Sequence
Bringing the drive to an enabled state requires a specific sequence. In the Control Word, set the following bits in the following order:
Bit 10 = 1   043F (hex)   Enable the PZD channel, if it is to be used.
Bit 1 = 1   0002 (hex)   Disable "Inhibit Voltage".
Bit 2 = 1   0006 (hex)   Disable "Fast Stop – with amp disable".
Bit 4 = 1   0016 (hex)   Disable "Fast Stop – with amp enabled".
Bit 5 = 1   0036 (hex)   Disable "Pause".
Bit 0 = 1   0037 (hex)   Enable amplifier.
Bits 3 = 1   003F (hex)   Operation enabled.
Follow the state diagram and state transition table in the manual for more details.

Special note concerning writing to PNU 930 (OPMODE)
The following sequence must be used when setting the OPMODE:
1. In the GUI, set the Opmode to Digital Velocity, or anything other than Position mode.
2. Set Control Word Bit 10 = 0.
3. Set PKE = 03A2 (hex), IND = 0000 (hex), and PWE = 00000002 (hex) for Profibus OPMODE 2 (Position Mode, what we normally know as drive parameter OPMODE = 8).
4. Then change the first digit of PKE from 0 to 3 (PKE = 33A2 hex).
5. Set Control Word Bit 10 = 1. The OPMODE will not change until Bit 10 goes high.

Example: To run a motion task:
1. Set PZD2 to the number of the task to be run.
2. Set Control Word Bit 6 = 1. The response to the controller will be as follows: PZD2 = actual speed, and PZD3 and PZD4 = actual position.
3. Set Control Word Bit 14 = 1 to use the Direct Motion Task (Motion Task 0).
4. Now set PZD2 and PZD3 = Velocity Command, PZD4 and PZD5 = Position Setpoint, and PZD6 = Motion Task Type (O_C parameter).
5. Set Bit 6 = 1 to start motion.
6. While the motor is moving, set Bit 4 = 0 (Fast Stop).
7. Start motion again and then set Bit 2 = 0 (Fast Stop with disable).

HMS Profibus DP Master Simulator Instructions

This simulator consists of the HMS RS-232 to Profibus DP cable adapter and the HMS Profibus Master software. It is a simulated controller.

To start communications, perform the following steps:

1. Connect the Serial to Profibus adapter between a com port and the Profibus card in the drive.
2. In the Simulator software, select the com port that the adapter is using.
3. Click on "Address" and "Start Search." After the drive is found, you can stop the search and close the search window.
4. Click on "Communication" and "Easy Start." Click OK for the warning.

The rows in the Output Data list are the nibbles of the 20 byte Profibus telegram. Click on a row and set the bits (or hex number) in the Edit section. As soon as the bits are set, those bits are sent to the drive. The Input Data list is the bits that are returned from the drive to the simulator.

Each row is a byte, so rows 1 and 2 make up the first word (PKE) of the Profibus telegram.

Row		Bits
1	PKE	15…8
2	PKE	7…0
3	IND	15…8
4	IND	7…0
5	PWE	31…24
6	PWE	23…16
7	PWE	15…8
8	PWE	7…0
9	STW (Control Word)	15…8
10	STW (Control Word)	7…0
11	HSW (PZD2)	15…8
12	HSW (PZD2)	7…0
13	PZD3	15…8
14	PZD3	7…0
15	PZD4	15…8
16	PZD4	7…0
17	PZD5	15…8
18	PZD5	7…0
19	PZD6	15…8
20	PZD6	7…0

Required items for using this simulator:

1. Profibus option card
2. Simulator software
3. Adapter – RS-232 to Profibus
4. Serial cable (9-pin, straight-through)
5. Drive GUI
6. Communication cable.
7. USB to Serial adapter (With driver)
8. Profibus manual for S300/S600