

PROFIPOWER
PROFIBUS - GATEWAY



profibus gateway
Communication Network


POWER ELECTRONICS

PROFIPOWER
PROFIBUS - GATEWAY

modbus – profibus gateway
Communication Network

Edition: June 2007

GBC02CI Rev. C

SAFETY SYMBOLS

Always follow safety instructions to prevent accidents and potential hazards from occurring.



This symbol means improper operation may result in serious personal injury or death.



Identifies shock hazards under certain conditions. Particular attention should be given because dangerous voltage may be present. Maintenance operation should be done by qualified personnel.

Edition of June 2007

This publication could present technical imprecision or misprints. The information here included will be periodically modified and updated, and all those modifications will be incorporated in later editions.

To consult the most updated information of this product you might access through our website www.power-electronics.com where the latest version of this manual can be downloaded.

Revisions

Date	Revision	Description
16 / 06 /2006	A	Software version Profipower 1.0
31 / 10 /2006	B	Wiring updating for SD700 and V5
13 / 06 /2007	C	Misprints update

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SAFETY INSTRUCTIONS

IMPORTANT!

- Safety instructions showed in this manual are useful to teach user how to use the product in a correct and safety way with the purpose of preventing possible personal injuries or property damages.
- Safety messages included here are classified as it follows:



WARNING

Do not remove the cover while the power is applied or the unit is in operation.

Otherwise, electric shock could occur.

Do not run the inverter with the front cover removed.

Otherwise, you may get an electric shock due to the high voltage terminals or exposure of charged capacitors.

Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.

Otherwise, you may access the charged circuits and get an electric shock.

Wiring and periodic inspections should be performed at least 10 minutes after the equipment that is going to be connected to this gateway is disconnected from the input power and after checking the DC Link voltage is discharged with a meter (below 30VDC).

Otherwise, you may get an electric shock.

Operate the switches with dry hands.

Otherwise, you may get an electric shock.

Do not use cables with damaged insulation.

Otherwise, you may get an electric shock.

Do not subject the cables to the abrasions, excessive stress, heavy loads or pinching.

Otherwise, you may get an electric shock.



CAUTION

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the gateway.

Otherwise, fire or accident could occur.



WARNINGS

RECEPTION

- Material of Power Electronics is carefully tested and perfectly packed before leaving the factory.
 - In the even of transport damage, please ensure that you notify the transport agency and POWER ELECTRONICS: 902 40 20 70 (International +34 96 136 65 57) or your nearest agent, within 24hrs from receipt of the goods.
-

UNPACKING

- Make sure received merchandise corresponds with delivery note, models and serial numbers.
 - Each gateway is supplied with a technical manual.
-

SAFETY

- Before operating the equipment, read this manual thoroughly to gain and understanding of the unit. If any doubt exists then please contact POWER ELECTRONICS, (902 40 20 70 / +34 96 136 65 57) or your nearest agent.
 - Wear safety glasses when operating the equipment with power applied and the front cover is removed.
 - Install the inverter according to the instructions within this manual.
 - Ensure that the mounting orientation is correct.
 - Do not drop the gateway or subject it to impact.
 - The Profipower gateways contain static sensitive printed circuits boards. Use static safety procedures when handling these boards.
-

CONNECTION PRECAUTIONS

- To ensure correct operation of the equipment it is recommended to use a SCREENED CABLE for the control wiring.
-

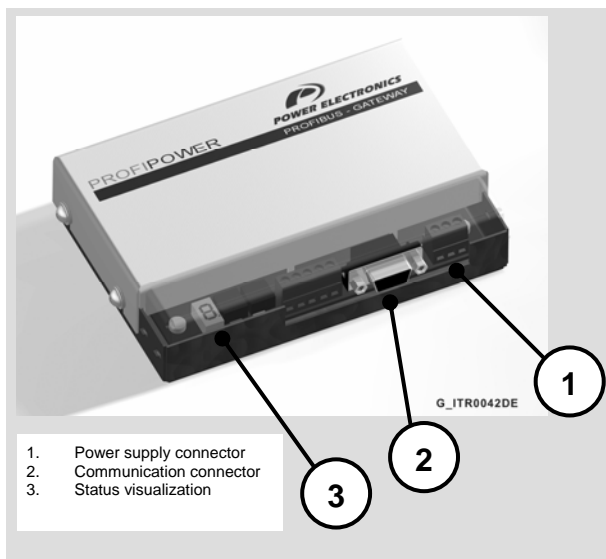
TRIAL RUN

- Follow the steps described in this manual.
 - Always apply voltage and current signals to each terminal that are within levels indicated within this manual. Otherwise, damage to the gateway may result.
-

1. INTRODUCTION

1.1. Equipment Description

The Profipower gateway allows integrating all of the equipments of Power Electronics into Profibus networks easily and comfortably. Its useful design will allow you to know the operating status of the gateway all the time.



2. TECHNICAL CHARACTERISTICS

2.1. General Information

2.1.1. Interfaces

Profibus-DP Connector 9 Pin D-SUB / F.

Voltage terminals 3 wires.

RS232 terminals 3 wires.

2.1.2. Power Supply Source

Rated value 24 Vdc.

Allowed range (curly included) 18 to 28Vdc.

Maximum Consumption 130mA.

+24V Limitation to 130mA.

2.1.3. Electrical Insulation

Profibus – DP / RS232 connection 500Vac.

2.1.4. Local Indications

ON Led (Green): If it is lit indicates operative voltage. The gateway is power supplied.

FAULT Led (Red): If it is lit indicates gateway fault.

7 segments display: it indicates the status of the gateway.

2.1.5. Profibus-DP Interface

Profibus – DP Interface.

Transmission speed Auto-detected at 12Mb.

Diagnosis data length of 13 Bytes (maximum).

Data length of Set up of 176 Bytes (maximum).

Configuration data length of 8 Byte (maximum).

Polling length of 120 Bytes (maximum).

File GSD PWE_05DD.GSD.

2.2. Dimensions

External dimensions of Profipower gateway can be observed in the attached figure. The device is ready to be installed on Din profile.

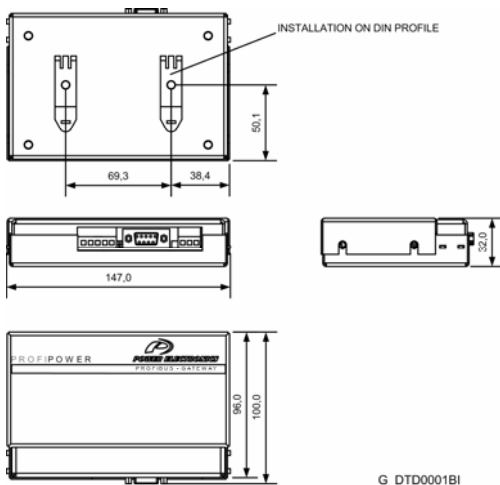


Figure 2.1 Profipower dimensions. Modbus – Profibus gateway

3. INSTALLATION AND CONNECTION

3.1. Installation of Profipower Gateway

The Profipower gateway of Power Electronics is a module to connect the inverters and soft starters of Power Electronics to a PROFIBUS network directly. It is necessary to use one gateway for each equipment to connect it to the network.

Note: Gateway installation does not involve that the inverter or soft starter and/or the power is configured or connected in a correct way respectively. Make sure the peripheral installation is well done to guarantee a correct operation of the system.



CAUTION

Motor controllers of Power Electronics operate with a high electric energy.

Make sure the power supply has been disconnected and wait for at least 10 minutes to guarantee that DC Link voltage is discharged, before installing the interface module of Profibus. Otherwise, you may get personal injuries or an accident could occur.

The gateway should be installed near to the motor controller. The maximum distance between the motor controller and the gateway should be of 3 meters, but only if it is necessary.

3.2. Connections of Profipower Gateway

3.2.1. Description of terminals and Leds

In the Profipower gateway, it exist different connectors to install this gateway and to connect it to the variable speed drives and digital soft-starters of Power Electronics.

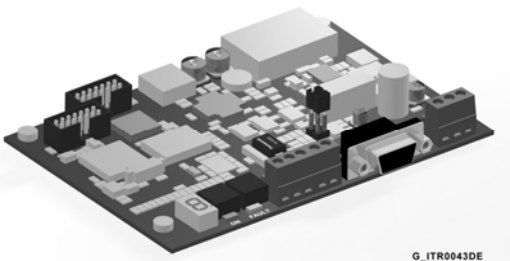


Figure 3.1 Location of the connectors of the Profipower interface

TERMINALS	DESCRIPTION
U109	7 segments display. It shows the operation status of the Profipower gateway.
J201 (PROFIBUS)	Connector SUB-D 9 pins to connect the signals of the Profibus network.
JP203 (MODBUS)	RS232 port to connect Modbus signals. 1: TxD signal 2: RxD signal GND: Common for communications
JP204 (MODBUS)	RS485 port to connect Modbus signals. B: High Signal (+) A: Low Signal (-)

TERMINALS	DESCRIPTION
J301 (POWER)	Connector for the signals of the gateway power supply. Power supply connection of 24Vdc. +24V: Positive of the power supply source. GND: Negative of the power supply source. PE: Ground
J1 (Jumper 1)	To connect the ending resistors of the network. If it is not necessary to enable the ending resistor of the network, the jumper will be not connected. Otherwise, the jumper will be connected and so these resistors will be enabled.
U107, U108	Rotary selectors to adjust the addresses in Hexadecimal. Selectors are on the right-hand side of the 7 segments display.
ON Led	Green. If it is lit indicates that the gateway is power supplied.
FAULT Led	Red. If it is lit indicates that the gateway is in fault status.

You can observe the above mentioned terminals below:

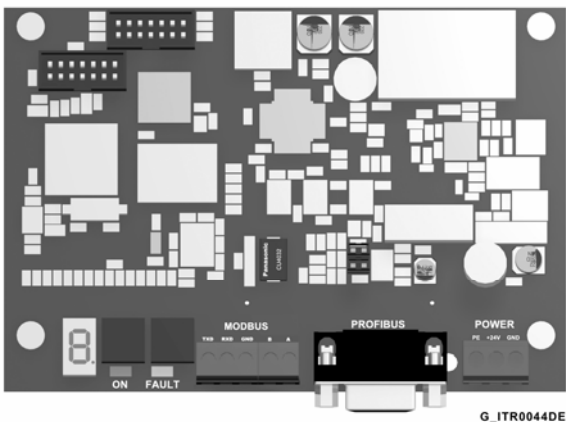


Figure 3.2 Description of the Profipower interface terminals

3.2.2. Profibus Connections

For profibus connection, a standard connector SUB-D 9 pins is used according to the definition of the standard EN 50170. The wiring for the connector of nine pins is shown in the attached figure.

If additionally, more information is required, refer to “*Installation Guide of PROFIBUS DP/FMS*” of the profibus users group, where you can find more detailed information about the connection.

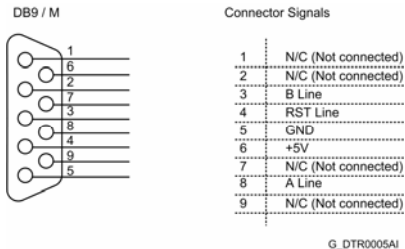


Figure 3.3 Connections of the connector SUB-D 9 pins

3.2.3. Connection for Equipments of Power Electronics

3.2.3.1. Variable Speed Drives of SD250 Series

Use S+ terminal to connect RS485 high signal and use S- terminal to connect RS485 low signal.

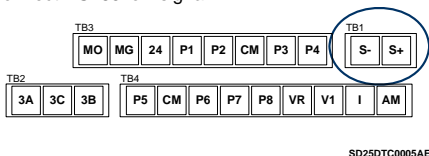


Figure 3.4 TB1 connector of the control board

RS485 communication data:

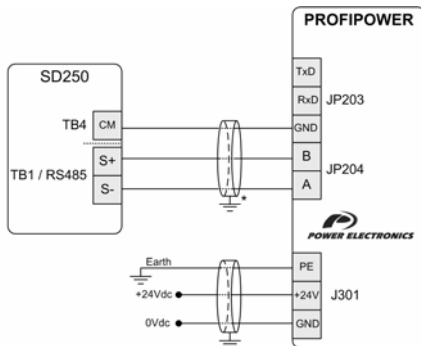
- Transmission form: Bus method, Multi drop Link System.
- Applicable drives: SD250.
- Converter: RS232 converter.
- Connectable drives: Maximum 31.
- Transmission distance: Below 1.200m maximum (700m recommended).
- Recommended cable: 0.75mm² (18AWG), Shield type twisted-pair.
- Installation: S+ and S- terminals of TB1 connector located on control board.
- Power supply: Power supply insulated from the drive power supply.

After connecting the communication line, set the following parameters as follows:

Par.	Description	Setting	
drv	Drive mode	3	RS485 communication.
Frq	Frequency setting mode	7	RS485 communication.
l60	Slave No. in communic. network	1 – 250	Use different numbers in case of more than 1 inverter is installed.
l61	Transmission speed	3	9.600bps; factory setting.

Par.	Description	Setting	
162	Stop mode after signal loss	0	Non stop. Factory setting.
163	Time to determ. signal loss	1.0sec	Factory setting.
159	Communication protocol	0	0: Modbus RTU

Connection drawing:



* The connection of the shield could be realized on the gateway terminals or on the opposite extreme of the cable, depending on the installation conditions.

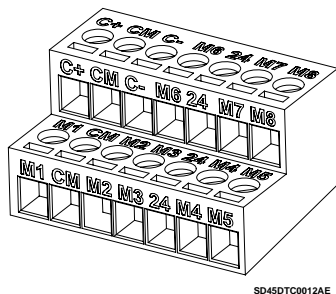
SD25DTR0001CI

Figure 3.5 Connection of SD250 – Profipower gateway

3.2.3.2. Variable Speed Drives of SD450 Series

Use C+ terminal to connect the RS485 high signal and C- terminal to connect the RS485 low signal.

Ground will be connected to the CM terminal. All of these terminals are located in the connector of the figure.



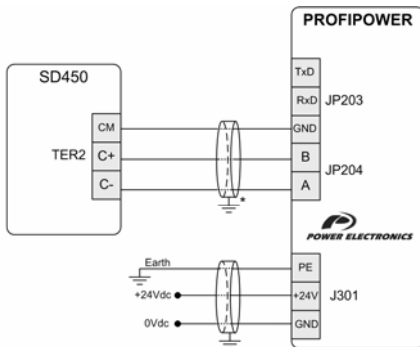
SD45DTC0012AE

Figure 3.6 TER2 connector of control board

RS485 communication data:

- Transmission form: Bus method, Multi drop Link System.
- Applicable drives: SD450.
- Connectable drives: Maximum 31.
- Transmission distance: Below 1200m maximum (700m recommended).
- Recommended cable: 0.75mm² (18AWG), shield type twisted-pair.
- Installation: C+, C- and CM terminals.
- Power supply: Power supply insulated from the drive power supply.

Connection drawing:



* The connection of the shield could be realized on the gateway terminals or on the opposite extreme of the cable, depending on the installation conditions.

SD45DTR0001CI

Figure 3.7 Connection of SD450 – Profipower gateway

3.2.3.3. Variable Speed Drives of SD700 Series

Connection drawing:

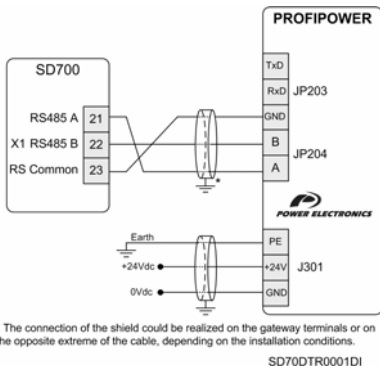


Figure 3.8 Connection of SD700 – Profipower gateway RS485 port

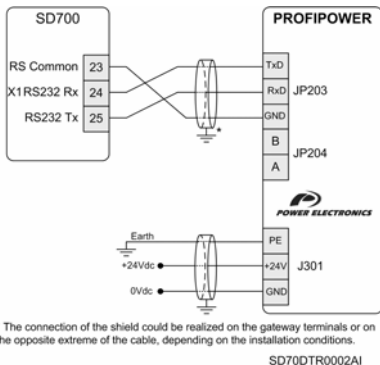


Figure 3.9 Connection of SD700 – Profipower gateway RS232 port

3.2.3.4. Digital Soft-Starter V5 Series

Connection drawing:

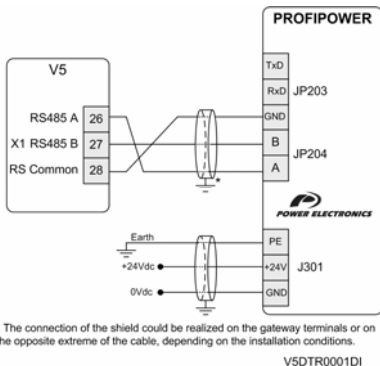


Figure 3.10 Connection of V5 – Profipower gateway RS485 port

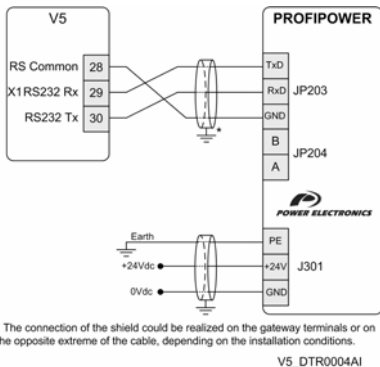


Figure 3.11 Connection of V5 – Profipower gateway RS232 port

3.3. Setting of Profibus Address

Two rotary selectors are used to adjust the Profibus address of the gateway. Through these selectors, we obtain a hexadecimal reading of the device address.

The range of the valid addresses goes from 1 to 125. That is, from 0x01 to 0x7D. In case of trying to assign a not valid address, for example 0xFF, display will show Error 3.

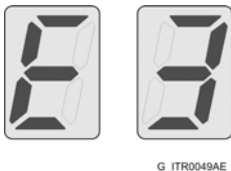


Figure 3.12 Message of Error 3 – Error in Profibus controller

When the Profipower gateway starts at the first time, it will try to communicate by the Modbus address that is given by the Profibus address, that is, it will try to communicate with the address established in the rotary selectors. This address is established as 1 by default, that is, 0x01.

If the set address is out of the allowed range, the error above indicated will be shown. Verify the setting of both rotary selectors and adjust them properly.

If, after all, the gateway does not obtain any answer, a search of the Modbus address of the connected equipment will be realized. This process can take around 35 seconds (approximately). Once an answer is found, it assigns the Profibus address to the equipment.

If it does not find any answer, display will show Error 1.

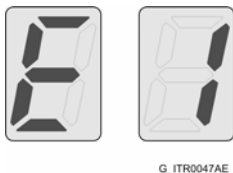




Figure 3.13 Message of Error 1 – Modbus communication error






The Profibus part of the gateway starts completely for the purposes of configuration by the Profibus Master. Obviously, the sending and reception through Modbus will not be realized until the Modbus part is initialized.

If the Profibus address is changed, the gateway will be restarted and the process will be repeated.

3.4. Display and Faults Code

The display that indicates the status will show different messages according to the following codification:

Display	Message	Description
 G_ITR0045AE	Consecutive lighting of all of the leds	Firmware reset of the gateway.
 G_ITR0046AE	"b" blinking	It is searching a Modbus device.

Display	Message	Description
 <p style="text-align: center;">G. ITR0047AE</p>	<p>Error 1. It alternates "E" with "1"</p>	<p>Modbus communication error.</p>
 <p style="text-align: center;">G. ITR0048AE</p>	<p>Error 2. It alternates "E" with "2"</p>	<p>Profibus controller is not initialized.</p>
 <p style="text-align: center;">G. ITR0049AE</p>	<p>Error 3. It alternates "E" with "3"</p>	<p>Error in Profibus controller.</p>
 <p style="text-align: center;">G. ITR0050AE</p>	<p>Double blade</p>	<p>The gateway is not configured by the Profibus master.</p>
 <p style="text-align: center;">G. ITR0051AE</p>	<p>Two horizontal lines</p>	<p>The gateway is in data exchange status.</p>

4. TRIAL RUN

4.1. Introduction

Profipower-Gateway device is a ProfiBus-DP slave with the following characteristics:

- Modular station with 6 modules.
- Diagnosis with status message.

Before beginning the information exchange between the slave and the Profibus network, the slave should be configured by the master. There are several main services that are described below.

4.1.1. Diagnosis

Between the standard continuous cycles of communication and in the beginning stage of the network, the master sends continuous diagnosis messages. These messages allow the master to know if a new slave has been configured by reading the status in the network of the drive.

The master supplies the required parameters and configurations that still have not been installed.

Once the slave is into the network, diagnosis data exchange is only used by the slave to notify the master a change in the operation status. The use of these messages is extensive to notify errors in the gateway.

4.1.2. Set up

The set up messages are frames (up to 244 bytes of length) that contain all of the configuration parameters of the Profipower gateway. The gateway uses this information to configure the Modbus communication before entering in data exchange mode.

4.1.3. Configuration

Configuration message indicates the size of the I/O transference messages to the slave.

The modules that can be configured are the following ones:

ProfiPower Type 1

Generic module. 5 output registers, 5 input registers.

ProfiPower Type 2

Generic module. 60 output registers, 60 input registers.

ProfiPower SD700 Type 1

Specific module for Variable Speed Drive SD700.

5 output registers, 5 input registers.

ProfiPower SD700 Type 2

Specific module for Variable Speed Drive SD700.

60 output registers, 60 input registers.

ProfiPower SD700 Type 3

Pre-defined module for SD700 Series.

5 output registers Output, 2 input registers.

ProfiPower SD700 Type 4

Pre-defined module for SD700 Series.

27 output registers, 23 input registers.

The gateway reports the Profibus Master the possible errors that can be produced in it. For that, it uses the frames of diagnosis notification that can be visualized by any Profibus Master Software.

The errors that can be notified are the following ones:

4.1.4. Errors referred to the configuration

- Err. WR REG. NUMBER
Number of writing registers is not valid.

- Err. RD REG. NUMBER
Number of reading registers is not valid.

- Err. PARAM. LENGTH
Parameters length is not valid.

- Err. SCEN. NUMBER
Number of scenarios is not valid.

- Err. MODBUS DEVICE
Fault in the Modbus part.

- Err. CONFIG. FRAME
Fault in the Profibus frame.

- Err1: MODBUS CRC
Error CRC.
- Err2: FN UNKNOWN
Unknown Modbus function.

- Err4: MODBUS Timeout
Communication fault. Exceeded time.

4.1.5. Errors referred to the communication

- Err11: ILLEGAL FUNCTION

Not valid function. The received function code is not allowed for the slave. This is possible because the code is only for newer elements and it is not implemented in the selected unit. Also it can indicate that the master or the slave is in a wrong status for the processing of this type of functions (for example, because the device is not configured and registers values are being asked to it).

- Err12: ILLEGAL DATA ADDRESS

The received data address is not an address allowed for the master or the slave. In detail, the combination of the reference number and the transferred length is not valid. For a controller with 100 registers, a request with an offset of 96 and length of 4 will operate correctly, but a request with an offset of 96 and length of 5 will generate an exception code 12.

- Err13: ILLEGAL DATA VALUE

A value contained in the data field of the request is not allowed for the master or the slave. This indicates a fault in the remainder structure of a complex request, therefore, the implicated length is not correct.

- Err14: SLAVE DEVICE FAILURE

Non-recoverable error has been produced while the master or the slave was waiting for executing the requested action.

- Err15: ACKNOWLEDGE

Specific use together with programming orders. The master or the slave has accepted the request and is processing it, but the device will take a long time to do it. To avoid a fault due to exceeded time (time-out) in the customer part, it will send this answer.

- Err16: SLAVE DEVICE BUSY

Specific use together with programming orders. The master or the slave is processing a long duration command. The master should transmit this request later again.

- Err18: MEMORY PARITY ERROR

Specific use together with function codes 20 and 21. The reference type 6, to indicate that the extended part of the file, has failed when passing the consistency test. The master or the slave tries to read a recorded file, but a parity error in the memory is detected.

- Err20: GATEWAY PATH UNAVAILABLE

Specific use together with interfaces. It indicates that the interface (gateway) is unable to assign an internal communication path from the input port to the output port to process the requests.

- Err21: GATEWAY FAILED TO RESPOND

Specific use together with interfaces. It indicates that any answer has not obtained from the device. It usually means that the element is not present in the network.

4.1.6. Data Exchange

Once the Set up and Configuration telegrams have been accepted, the gateway goes into the information exchange mode with the profibus master.

4.2. Trial Run with Siemens (Step 7 Set-up)

4.2.1. Installation of GSD File

Install GSD file with the hardware configuration tool of the SIMATIC administrator.

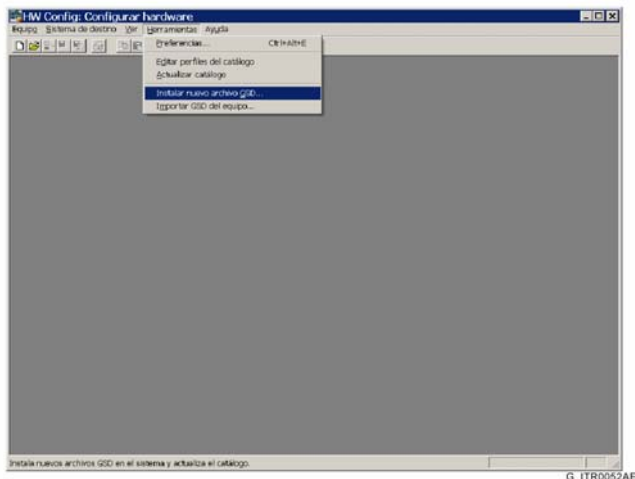


Figure 4.1 Screen 1 of GSD file installation

Select **PWE_05DD.GSD** file.

Then, create a new project and insert a master and a slave.

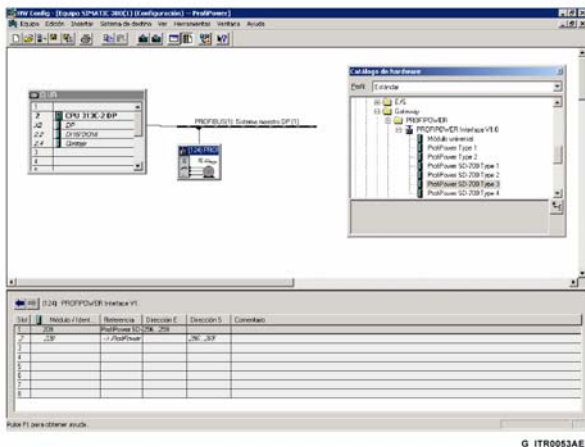


Figure 4.2 Screen 2 of GSD file installation

Once inserted the slave, a module should be assigned to this slave, and should be configured correctly. For that reason, it is fundamental to know how many registers are going to be written and how many registers are going to be read.

All of the modules available in the Profipower gateway are described in the following section.

4.3. Configuration and Set up.

4.3.1. Profipower Type 1 module.

It is a generic module that allows 5 output registers and 5 input registers.

To configure this generic module, we will define the parameter “*Scenario*”. The Scenarios are the Modbus frames that we want to send.

Each Scenario is completely defined with a base address of Modbus register and a number of Modbus registers from this base address.

This determines the Modbus registers block to be read or written.

If base address is 40000, and 5 registers can be written, the scenario can be configured with the address 40000 and the position 5. This allows writing in the addresses from 40000 to 40004, all consecutive. This is also valid for the reading function.

For this module it can be defined up to 10 Scenarios, such as it has been indicated above. These Scenarios are 5 for the write command and the other 5 are for read command. This is a generic module and, therefore, it is independent of the equipment connected to the gateway. For this reason, user will be responsible of the knowledge of the valid Modbus registers for the equipment that is going to be connected.

Thanks to this, the registers can be alternate or random instead of consecutive. In this way, for example, if you want to write in the registers 40000, 40008, 40012, you should configure 3 writing scenarios: the first one with the address 40000 and the position 1, the second one with the address 40008 and the position 1, and the third one with the address 40012 and the position 1. So, it is being indicated from each position it only will be written 1 register (the indicated one).

The defined frames for this module are: 10 bytes of Data-Output and 10 bytes of Data-Input.

Therefore, the maximum number of selected Modbus registers will be 5 for the writing Scenarios and 5 for the reading Scenarios. That is, all the registers selected for the configured writing Scenarios do not exceed 5. And in the same way, all the registers selected for the configured reading Scenarios do not exceed 5.

Note: When you introduce the Modbus addresses of the desired parameters for reading and writing in the Hardware configuration of the gateway, you should consider the following points:

- If the slave equipment is a model of SD250 or SD450 Series, the addresses will be introduced by subtracting “1” to the value that appears in the manual of this equipment. For example: if the address indicated in the manual is “0x000A”, you should introduce the value “9”.
- If the slave equipment is a model of SD700 Series or V5, you should subtract “40001” to the address indicated in the manual of the equipment, and then you should introduce the resultant value in the gateway configuration. For example, if the address indicated in the manual is “40003” you should introduce the value “2”.
- If the slave equipment is a model of SD700 Series and it is configured from a base address as much of reading as of writing, you should make sure the registers that you want to access have modbus addresses correlative to selected base address. Consult the modbus communication manual of the equipment for additional information.

The description of the Profibus frame will be determined by the realized set up of the scenarios.

As well as the Scenarios, we will have to configure the parameter “*Modbus Device*” to indicate the Modbus device that is going to be connected to the gateway.

The gateway supports the following Modbus slaves:

- Variable Speed Drive of SD700 Series.
- Variable Speed Drive of SD450 Series.
- Variable Speed Drive of SD250 Series.
- Digital Soft-Started of V5 Series.

Note: To connect other slaves, contact with Power Electronics.

Finally, also the parameters related to the Modbus communication can be configured:

- Transmission Speed (Baud rate)
- Exceeded Time (Time out)
- Stop bit
- Parity bit
- Retries

4.3.2. Profipower Type 2 Module

For this module it can be defined up to 20 Scenarios, 10 for the write command and the other 5 for the read command. It is a generic module and, therefore, it is independent of the equipment connected to the gateway. For this reason, user will be responsible of the knowledge of the valid Modbus registers for the equipment that is going to be connected.

The defined frames for this module are: 120 bytes of Data-Output and 120 bytes of Data-Input.

Therefore, the maximum number of selected Modbus registers will be 60 for the writing Scenarios and 60 for the reading Scenarios. That is, all the registers selected for the configured writing Scenarios do not exceed 60. And in the same way, all the registers selected for the configured reading Scenarios do not exceed 60. The configuration of the Scenarios will be realized in the same way that has been explained for the Profipower Type 1 Module.

Note: When you introduce the Modbus addresses of the desired parameters for reading and writing in the Hardware configuration of the gateway, you should consider the following points:

- If the slave equipment is a model of SD250 or SD450 Series, the addresses will be introduced by subtracting “1” to the value that appears in the manual of this equipment. For example: if the address indicated in the manual is “0x000A”, you should introduce the value “9”.
- If the slave equipment is a model of SD700 Series or V5, you should subtract “40001” to the address indicated in the manual of the equipment, and then you should introduce the resultant value in the gateway configuration. For example, if the address indicated in the manual is “40003” you should introduce the value “2”.
- If the slave equipment is a model of SD700 Series and it is configured from a base address as much of reading as of writing, you should make sure the registers that you want to access have modbus addresses correlative to selected base address. Consult the modbus communication manual of the equipment for additional information.

The description of the Profibus frame will be determined by the realized set up of the scenarios.

As well as the Scenarios, we will have to configure the parameter “*Modbus Device*” to indicate the Modbus device that is going to be connected to the gateway. The gateway supports the Modbus slaves that have been enumerated in the previous section.

And also the parameters related to the Modbus communication that have been indicated for the generic module type 1 can be configured.

4.3.3. Profipower SD700 Type 1 Module

For this module it can be defined up to 10 Scenarios, 5 for the write command and the other 5 for the read command. This module is specific for the SD700 drive, therefore, the gateway will be set up with the valid Modbus address for the SD700. User only must select the available Modbus registers.

The defined frames for this module are: 10 bytes of Data-Output and 10 bytes of Data-Input.

Therefore, the maximum number of selected Modbus registers will be 5 for the writing Scenarios and 5 for the reading Scenarios. That is, all the registers selected for the configured writing Scenarios do not exceed 5. And in the same way, all the registers selected for the configured reading Scenarios do not exceed 5.

The description of the Profibus frame will be determined by the realized set up of the scenarios.

And also the parameters related to the Modbus communication that had been indicated for the generic module type 1 can be configured.

The following figure shows an example of Scenarios set up for the Profipower SD700 Type 1 Module.

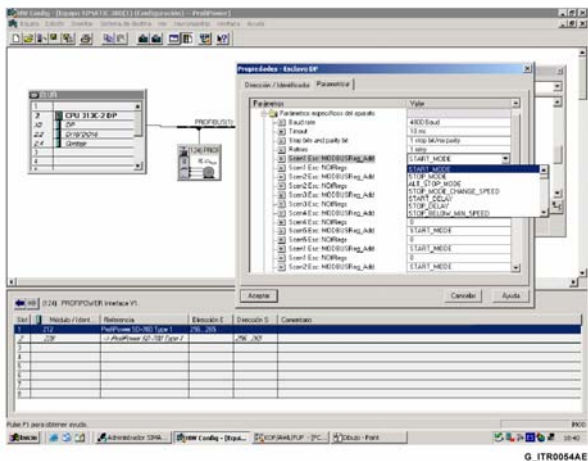


Figure 4.3 Configuration screen of Profipower SD700 type 1 Module

Once selected this module, it will not be necessary to introduce the memory addresses, but rather it will be possible to work with the name of the variables directly, such as the previous figure shows.

4.3.4. Profipower SD700 Type 2 Module

For this module it can be defined up to 20 Scenarios, 10 for the write command and the other 10 for the read command. This module is specific for the SD700 drive, and it will operate in the same way that the module described previously. The gateway will be set up with the valid Modbus address for the SD700. User only must to select the available Modbus registers.

The defined frames for this module are: 120 bytes of Data-Output and 120 bytes of Data-Input.

Therefore, the maximum number of selected Modbus registers will be 60 for the writing Scenarios and 60 for the reading Scenarios. That is, all the registers selected for the configured writing Scenarios do not exceed 60. And in the same way, all the registers selected for the configured reading Scenarios do not exceed 60.

The description of the Profibus frame will be determined by the realized set up of the scenarios.

And also the parameters related to the Modbus communication that had been indicated for the generic module type 1 can be configured.

4.3.5. Profipower SD700 Type 3 Module

This module and the next one are modules for the SD700 that already have the Modbus registers for reading and writing defined. User only must write the value of the registers. Pre-defined registers for these modules are shown in the attached table.

The Profipower gateway receives 10 bytes of output data of the ProfiBus-DP Master.

Output Data (Word)	Variables
0	LOCAL_SPEED_REF
1	HOST_START_CONTROL
2	HOST_STOP_CONTROL
3	HOST_RESET_CONTROL
4	HOST_TRIP_CONTROL

The Profipower gateway sends 4 bytes of input data to the ProfiBus-DP Master.

Input Data (Word)	Variables
0	ACTUAL_SPEED_REFERENCE
1	GENERAL_STATUS

4.3.6. Profipower SD700 Type 4 Module

This is also a pre-defined module, although broader than the previous one. A high number of Modbus registers for reading and writing has been defined. User only must write the value of the registers.

Pre-defined registers for these modules are shown in the attached table.

The Profipower gateway receives 54 bytes of output data of the ProfiBus-DP Master.

Output Data (Word)	Variables
0	LOCAL_SPEED_REF
1	HOST_START_CONTROL
2	HOST_STOP_CONTROL
3	HOST_RESET_CONTROL
4	HOST_TRIP_CONTROL
5	LIMIT1_MIN_SPEED
6	LIMIT2_MIN_SPEED
7	LIMIT1_MAX_SPEED
8	LIMIT2_MAX_SPEED
9	CURRENT_LIMIT
10	TORQUE_LIMIT
11	INVERTED_SPEED_ENABLED
12	NAMEPLATE_MOTOR_CURRENT
13	NAMEPLATE_MOTOR_POWER
14	ACCELERATION_RATE
15	ALT_ACCELERATION_RATE
16	DECELERATION_RATE
17	ALT_DECELERATION_RATE
18	ACC_BRAKE_SPEED
19	DEC_BRAKE_SPEED
20	CURRENT_LIMIT_TIMEOUT
21	STOP_TIMEOUT
22	TORQUE_LIMIT_TIMEOUT
23	SUPPLY_UNDER_VOLTAGE
24	SUPPLY_OVE_VOLTAGE
25	CURRENT_LIMIT
26	TORQUE_LIMIT

The Profipower gateway sends 46 bytes of input data to the ProfiBus-DP Master.

Input Data (Word)	Variables
0	ACTUAL_SPEED_REFERENCE
1	GENERAL_STATUS
2	OUTPUT_MOTOR_CURRENT
3	OUTPUT_MOTOR_TORQUE
4	OUTPUT_MOTOR_POWER
5	OUTPUT_MOTOR_VOLTAGE
6	OUTPUT_MOTOR_FREQUENCY
7	MOTOR_COS_PHI
8	MOTOR_SPEED_RPM
9	MOTOR_SPEED_PERCENTAGE
10	DC_BUS_VOLTAGE
11	INPUT_VOLTAGE
12	ANALOG_INPUT_1_VALUE
13	ANALOG_INPUT_2_VALUE
14	ANALOG_OUTPUT_1_VALUE
15	ANALOG_OUTPUT_2_VALUE
16	DIGITAL_INPUT_STATUS
17	DIGITAL_OUTPUT_STATUS
18	COMPARATOR1_STATUS
19	COMPARATOR2_STATUS
20	COMPARATOR3_STATUS
21	ACTUAL_CTRL_SETPOINT
22	ACTUAL_FEEDBACK

5. PROGRAMMING FOR STEP 7

The controller of the device that is going to be connected to the gateway will be realized by using the PDOs (Process Data Objects) defined as modules of different length, in the gateway configuration. These PDOs can be mapped in the data area of a PLC, in case of using this one like Master ProfiBus.

Since all of the modules (or PDOs) defined for the gateway have more than 3 or 4 bytes of length, the SFCs (special system functions) SFC14 DPRD_DAT and SFC 15 DPWR_DAT will be used for data transmission and reception.

The following table shows the SFCs that will be used according to the modules selected for the gateway.

ProfiPower Module	Access path for Step 7
Profipower type 1	SFC14 (10 bytes) SFC15 (10 bytes)
Profipower type 2	SFC14 (32 + 32 + 32 + 24 bytes) SFC15 (32 + 32 + 32 + 24 bytes)
Profipower SD700 type 1	SFC14 (10 bytes) SFC15 (10 bytes)
Profipower SD700 type 2	SFC14 (32 + 32 + 32 + 24 bytes) SFC15 (32 + 32 + 32 + 24 bytes)
Profipower SD700 type 3	SFC14 (4 bytes) SFC15 (15 bytes)
Profipower SD700 type 4	SFC14 (32 + 14 bytes) SFC15 (32 + 22 bytes)

5.1. Example of program for Step 7

In the following example, the Profipower gateway is configured with the Profipower SD700 Type 3 Module.

Two Data Blocks are created: DB1 (Data Block 1) with 5 registers and DB2 (Data Block 2) with 2 registers.

Input data are copied to the DB2 by calling SFC14. Output data are copied from DB1 by calling SFC15.

Verify the length in bytes for the RECORD field must be the same as the configured module.

For additional information about the SFCs, consult the STEP 7 aid.

// Data Input

CALL "DPRD_DAT"

LADDR :=W#16#100

RET_VAL:=MW1

RECORD :=P#DB2.DBX0.0 BYTE 4

// Data Output

CALL "DPWR_DAT"

LADDR :=W#16#100

RECORD :=P#DB1.DBX0.0 BYTE 10

RET_VAL:=MW2

5.2. Monitoring and Modification of Modbus Registers

The following figure shows a value table created with Step7 for monitoring and modifying Modbus registers. This table corresponds to a gateway configuration with the Profipower SD700 Type 3 Module.

	Operando	Símbolo	Form	Valor de estado	Valor de forzado
1	//PROFIBUS FRAME PROFIPOWER SD-700 Type 3				
2	//Output Data				
3	DB1.DBW	0	DEC	200	200
4	DB1.DBW	2	DEC	0	
5	DB1.DBW	4	DEC	0	
6	DB1.DBW	6	DEC	0	
7	DB1.DBW	8	DEC	0	
8	//Input Data				
9	DB2.DBW	0	DEC	0	
10	DB2.DBW	2	DEC	-28547	
11					

Profipower(Equipo SIMATIC 300(1)...Programa S7(1) ▶ RUN

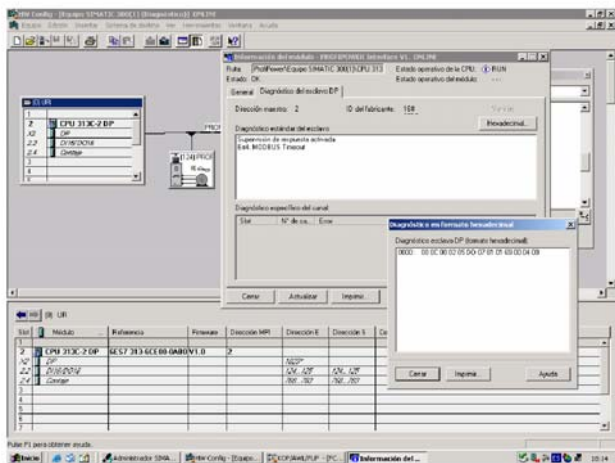
G_ITR0055AE

Figure 5.1 Monitoring and modification of Modbus registers

6. DIAGNOSIS

The Profipower gateway is able to send diagnosis messages.

The following figure shows an example of gateway diagnosis notification. Concretely, it notifies a Modbus communication error due to TimeOut.



G ITR0056AE

Figure 6.1 Sending of diagnosis messages



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