POWER ELECTRONICS

SD750

ACCESORIES MANUAL

PROFINET BOARD

LOW VOLTAGE VARIABLE SPEED DRIVE

SD750

LOW VOLTAGE VARIABLE SPEED DRIVE

Accessories Manual

Profinet board

Edition: February 2022

SD75MA03BI Rev. B

ABOUT THIS MANUAL

PURPOSE

This manual contains important instructions for the installation, configuration and use of the Profinet optional board for Power Electronics' SD750 variable speed drives.

TARGET AUDIENCE

This manual is intended for qualified customers who will install, operate and maintain Power Electronics SD750 variable speed drives.

Only trained electricians may install and commission the drives.

REFERENCE MANUALS

The following reference documents are available for SD750 variable speed drives:

- Hardware and Installation Manual.
- Programming and Software Manual.
- Maintenance Manual.
- Pumps Application Manual.

POWER ELECTRONICS CONTACT INFORMATION

Power Electronics USA Inc.
4777 N 44th Ave
Phoenix
AZ 85031
UNITED STATES OF AMERICA

US Sales: 602-354-4890 / (480) 519-5977
Fax: (415) 874-3001

Power Electronics España, S.L.
Polígono Industrial Carrases
Ronda del Camp d'Aviació nº 4
46160, Llíria (Valencia)
SPAIN

Fax: (+34) 96 131 82 01
Website: www.power-electronics.com

REVISIONS CONTROL		
DATE	**REVISION**	**DESCRIPTION**
02 / 10 / 2019	A	First Edition.
14 / 02 / 2022	B	Commissioning. Faults and warnings list.

EN

TABLE OF CONTENTS

SAFETY SYMBOLS

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

In this manual, safety messages are classified as follows:

 **WARNING**	Identifies potentially hazardous situations where dangerous voltage may be present, which if not avoided, could result in minor personal injury, serious injury or death. Be extremely careful and follow the instructions to avoid the risk of electrical shocks.
 **CAUTION**	Identifies potentially hazardous situations, which if not avoided, could result in product damage, or minor or moderate personal injury. Read the message and follow the instructions carefully.
 **NOTICE**	Identifies important measures to take in order to prevent damage equipment and warranty lost, as well as encouraging good use and environmental practices.

EN

Other symbols used in this manual for safety messages are the following:

	Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.
	Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.
	Caution, risk of electric shock. Energy storage timed discharge. Wait for the indicated time to avoid electrical hazards.
	Caution, risk of hearing damage. Wear hearing protection.

SAFETY INSTRUCTIONS

IMPORTANT!

Read carefully this manual to maximize the performance of the product and to ensure its safe installation and use.

In order to appropriately use the drive, please, follow all instructions described in the *Hardware and Installation Manual* which refer to transportation, installation, electrical connection and commissioning of the equipment.

For maintenance operations, follow the instructions from the *Maintenance Manual.*

Power Electronics accepts no responsibility for any damages resulting from incorrect use of equipment.

CAUTION

Read carefully the *Hardware and Installation Manual,* the *Maintenance Manual* and all documentation related to the drive to guarantee its safe use and avoid the risk of personal injuries and damages to the equipment.

Ensure compliance with local and national regulations of the installation site.

NOTICE

CAUTION IN CONNECTIONS

Use conductive paste between plates in every electrical connection. Otherwise, resistance will increase and an overheat in the contact zone of the conductors may occur.

INTRODUCTION

1

SD750 drives are compatible with several optional boards:

- Communication boards (Ethernet/IP, Profinet, CANopen…).
- Encoder board.
- Digital and analog I/O expansion boards.
- Optical fiber board

…among others. Up to three optional boards can be connected, maximum two of the same type.

EN

This manual focuses on the optional communication board Profinet. The Profinet board allows the SD750 to be configured as a slave of a PLC master using the Profinet industrial communication protocol. This communication allows information to be exchanged between both devices through the configuration of reading and writing variables**.**

Thanks to this board, the SD750 drive can be controlLED and monitored through the network, either by the user or through a PLC sequence program or any master device. Also, Profinet is easy to connect, allowing a faster installation and easier maintenance.

TECHNICAL FEATURES

2

Profinet Board Specifications

Feature	Description
Communication protocol	Profinet IO CC-A
Communication speed	100 Mbps
Communication type	Full Duplex
Max. number of nodes	64 ea
Service	DPV0 Custom
Topology	Line, Tree, Star topology

LED Indicators

The Profinet board includes 5 LEDs (status, run, ready, Eth1 y Eth2) that provide information about the power supply of the board, network detection and communication status. For further information, refer to section "*Connectors description and LED indicators*".

GSDML File

The GSDML file contains information about the Profinet communication module instalLED in a drive. When you configure the Profinet network, the network configuration software requires the GSDML file.

** For downloading the file, please contact Power Electronics.

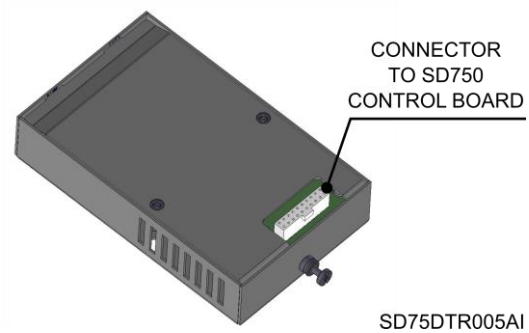
CONNECTION TO THE DRIVE

3

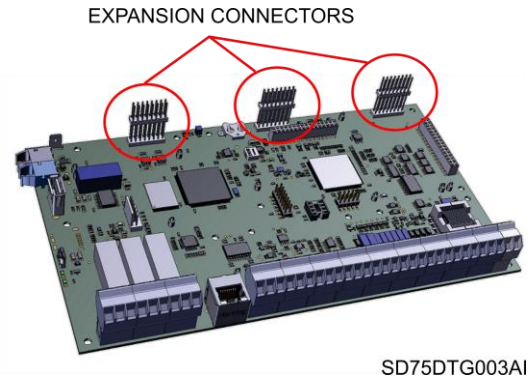
The Profinet board can be connected directly, through the connector on its back side, to any of the three expansion connectors of the SD750 drive central control board. Once connected, it allows integrating the SD750 drive in an Profibus network.

Once connected, it allows integrating the drive in a Profinet network. One Profinet board will be necessary for each equipment which is going to be connected to such network.

EN



SD75DTR005AI



SD75DTG003AI

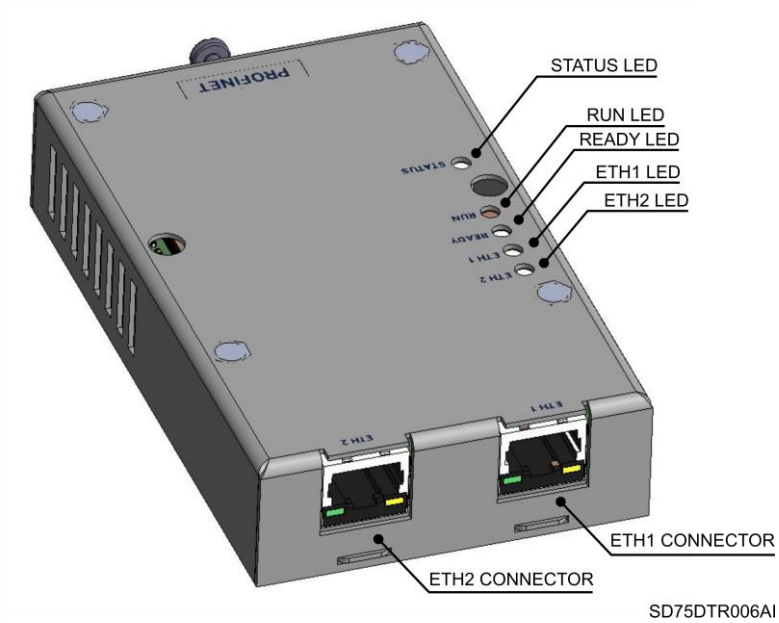
CAUTION

Power Electronics' SD750 drives 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 bus is discharged before installing the Profinet board. Otherwise, there is a risk of personal injuries or accidents.

Connectors description and LED indicators

The LED indicators on the Profinet expansion board provide information about the board and communication status. Please notice that some LEDs are bicolor and will change their color and frequency according to the situation. Refer to the following table for the description of all possible colors and frequency of each LED indicator, as well as what they represent.



All LEDs are explained in the following table:

LED	COLOR / FREQUENCY	DESCRIPCIÓN
STATUS	Red, steady	Hardware failure or inability to install the protocol. The board probably has to be repaired.
	Red, slow blinking	The board cannot stablish communication with the network controller or initialize the protocol.
	Red, fast blinking	The board cannot stablish communication with the SD750 central board.
	Green, slow blinking	The system is operating correctly [1].
	Green, fast blinking	Test mode. User has set the board to test mode.
RUN	Green	User application is running without errors.
READY	Green	Board's operating system is working correctly.
ETH1	Green, steady	**Device operational:** The devices is operating correctly
	Green, flashing	**Standby:** The device has not been configured.
	Red / green, flashing	**Self-test:** The device is performing its power up testing.
	Red, flashing	**Minor fault:** the device has detected a recoverable minor fault. E.g. an incorrect or inconsisten configuration can be considered as a minor fault.
	Red, steady	**Major fault:** The device has detected a non-recoverable major fault.
	Off	**No power:** The power supply to the device is missing.

[1] When we state that the system operates correctly, it means that the communication between the expansion board, the network controller and the central SD750 microcontroller is correct. This does not mean, however, that the communication with the PLC is correct.

LED	COLOR / FREQUENCY	DESCRIPCIÓN
ETH2	Green, steady	**Connected:** The device has at least one established connection (even to the Message Router).
	Green, flashing	**No connections:** The device has no established connections but has obtained an IP address.
	Red / green, flashing	**Self-test:** The device is performing its power up testing.
	Red, flashing	**Connection timeout:** One or more of the connections in which this device is the target has timed out. This status will be finished only if all timed out connections are reestablished or if the device is reset.
	Red, steady	**Duplicate IP:** the device has detected that its IP address is already in use.
	Off	**Not powered, no IP address:** The device does not have an IP address (or is powered off).

Note: “Device” refers to the communication slave.

EN

Finally, the two RJ45 connectors ETH1 and ETH2 allow ring communication in the Profinet network (the board can be connected to two different networks).

COMMISSIONING

4

The Profinet expansion board allows configuring the SD750 drive as a Profinet industrial communication slave. Once connected the board to the expansion connectors and loaded the GSDML in the PLC master, the parameters of the drive related to Profinet communication must be configured.

The following steps must be followed:

1. Load GSDML file in the PLC master.

   Once the GSDML file is loaded, which allows us to introduce the SD750 device into a Profinet network, the configuration from the PLC master will indicate to the system how many variables are going to share, both writing variables (from the PLC to the SD750) and reading variables (from the SD750 to the PLC). In both cases, the number of variables that can be selected is in power of 2, from 0 variables to 16. In other words, 0, 2, 4, 8, or 16 input variables can be configured and, in the same way, 0, 2, 4, 8 or 16 output variables. These variables are calLED Custom Modbus (see section "*Object Custom Modbus*").

2. Configure network parameters (G21, see section "*Parameters settings*") so they match with the data expected by the master

3. Configure the Profinet slave on the PLC master (network configuration and number of shared variables).

   The Master Input variables are the first 16 Custom Modbus variables, while the Master Output variables range from Custom Modbus 17 to 32.

4. Configure the Profinet slave on the PLC master (network configuration and Custom Modbus related to the shared variables). Network configuration is found in group G21.4.1 (see section "*Parameters settings*"). In case object Custom Modbus is used, configure variables in groups G21.4.2 and G21.4.3.

5. Verify communication is stablished. Configure action in case of communication faults with the master.

6. Connect communication wiring. By setting the following G23.3 parameters, ensure communication with the SD750 is correct and configure action in case of fault:

   - **G23.3.1 - Profinet board status** (read only): Shows the status of the Profinet board (1 for activated, 0 for de activated).
   - **G23.3.2 - Profinet board test**: Enables the LED fast blinking. Set this parameter on to check the communication with the Profinet expansion board (1 to enable the feature, 0 to disable it).

- **G23.3.3 - Profinet Com Error**: Allows defining the behavior of the drive in case communication with the Profinet board is lost (when G23.3.1 goes from 1 to 0):
  - Write 0 to ignore the communication loss.
  - Write 1 to trigger Warning "W48: Profinet expansion" *(*see "*5. Faults and Warnings list*"). Warning will hide if the connection is re-established.
  - Write 3 to trigger Fault "F108: Expansion Profinet comm" and stop the drive *(*see "*5. Faults and Warnings list*").

Once the slave has been configured correctly, both in the PLC and in the SD750 itself, the connection may be made, and the configured variables will be shared.

The rest of the commissioning depends on the PLC, the program used, etc.

EN

Parameters setting

Up next, the relevant parameters are summarized. **For details about the range of values and Modbus addresses, refer to the Software and Programming Manual for SD750 drives.**

Subgroup 21.4: Profinet

Subgroup 21.4 of the SD750 drive allows configuring Profinet.

Subgroup 21.4.1: ProfiNET Net

Network parameters configuration group.

Screen	Range	Function	Set on RUN
G21.4.1.1 IP address = 192.168.**1.143**	0 to 255	Sets the IP address of the equipment in the user local network. This address must be provided by the local network administrator. Format of the IP address is: A.B.C.D. To configure the address, enter a value in each of the four parameters that compose it.	NO
G21.4.1.2 Subnet **Mask = 255.255.255.0**	0 to 255	Sets the subnet mask address of the equipment in the user local network. This address must be provided by the local network administrator. Format of the subnet mask is: A.B.C.D. To configure the address, enter a value in each of the four parameters that compose it.	NO
G21.4.1.3 Gateway = 0.0.0.0	0 to 255	Sets the gateway address of the equipment in the user local network. This address must be provided by the local network administrator. Format of the gateway address is: A.B.C.D. To configure the address, enter a value in each of the four parameters that compose it.	NO
G21.4.1.4 MAC address= A.B.C.D.E.F	0x00 to 0xFF	Sets the MAC address. This address must be unique and exclusive and depends on the LAN board. This address must be provided by Power Electronics. Format of the MAC address is: A.B.C.D.E. F. To configure the address, enter a value in each of the six parameters that compose it.	NO

Subgroup 21.4.2: Master's input

Configuration group of the master's input variables for object Custom Modbus (PE Status). The number of variables to configure will depend on the number of variables selected in the master, up to 16.

Subgroup 21.4.2.1: Addresses

Screen	Range	Function	Set on RUN
Custom modbus addr1: 0 **Custom modbus addr2: 0** ... **Custom modbus addr16: 0**	0 to 65535	See "Subgroup 20.6: Custom Modbus address" on the SD750 *Software and Programming Manual.* Note: If these values are modified, the configuration of G20.6, G20.7, G21.3.2, G21.3.3 and G21.4.3 will change.	YES

Subgroup 21.4.2.2: Values

Screen	Range	Function	Set on RUN
Custom modbus val1: 0 **Custom modbus val2: 0** ... **Custom modbus val16: 0**	0 to 65535	See "Subgroup 20.7: Custom Modbus values" on the SD750 *Software and Programming Manual*. Note: If these values are modified, the configuration of G20.6, G20.7, G21.3.2, G21.3.3 and G21.4.3 will change.	YES

Subgroup 21.4.3: Master's output

Configuration group of the master's output variables for object Custom Modbus (PE Status). The number of variables to configure will depend on the number of variables selected in the master, up to 16.

Subgroup 21.4.3.1: Addresses

Screen	Range	Function	Set on RUN
Custom modbus addr17: 0 **Custom modbus addr18: 0** ... **Custom modbus addr32: 0**	0 to 65535	See "Subgroup 20.6: Custom Modbus address" on the SD750 *Software and Programming Manual.* Note: If these values are modified, the configuration of G20.6, G20.7, G21.3.2, G21.3.3 and G21.4.2 will change.	YES

Subgroup 21.4.3.2: Values

Screen	Range	Function	Set on RUN
Custom modbus val17: 0 **Custom modbus val18: 0** ... **Custom modbus val32: 0**	0 to 65535	See "Subgroup 20.7: Custom Modbus values" on the SD750 *Software and Programming Manual.* Note: If these values are modified, the configuration of G20.6, G20.7, G21.3.2, G21.3.3 and G21.4.2 will change.	YES

Subgroup 21.4.4: Connector 1 status

Screen	Range	Function	Set on RUN
G21.4.4 Connector 1 status = Off	Off On	Read-only parameter. Shows 1 whether connector 1 of the Profinet board is enabled; 0 if is not.	NO

Subgroup 21.4.5: Fault mode c1

Screen	Range	Function	Set on RUN
G21.4.5 Fault mode c1 = Fault	Fault Ignore	Reads connector 1 status and acts in consequence when communications with master is lost. **OPT.** / **FUNCTION** Fault: If the timeout is overcome, fault "F110: Lost PNET c1 comms" will be triggered. Ignore: Fault F110 will not be triggered..	YES

Subgroup 21.4.6: Connector 2 status

Read-only parameter, shows whether connector 2 of the Profinet board is off or on.

Screen	Range	Function	Set on RUN
G21.4.6 Connector 2 status = Off	Off On	Read-only parameter. Shows 1 whether connector 2 of the Profinet board is enabled; 0 if is not.	NO

Subgroup 21.4.7: Fault mode c2

Screen	Range	Function	Set on RUN
G21.4.7 Fault mode c2 = Fault	Fault Ignore	Reads connector 2 status and acts in consequence when communications with master is lost. **OPT.** / **FUNCTION** Fault: If the timeout is overcome, fault F111: "Lost PNET c2 comms" will be triggered. Ignore: Fault F111 will not be triggered.	YES

NOTICE

The status of connectors indicates the of communication status with the PLC master. In case the application does not require ring connection, the SD750 will have to be configured to ignore the fault of the unused connector.

- Fault 110: connector 1
- Fault 111: connector 2

Subgroup 21.4.8: Client comms status

Screen	Range	Function	Set on RUN
G21.4.8 Client comms status = OK	Ok Timeout	Read only parameter. Shows 0 when client communication works properly; 1 if timeout set in G21.4.10 is exceeded.	SÍ

Subgroup 21.4.9: Client comms fault

Screen	Range	Function	Set on RUN
G21.4.9 Client comms fault = Fault	Fault Ignore	Reads client communication status and acts in consequence when it is lost. **OPC.** / **FUNCIÓN** Fault: If the timeout is overcome, fault F63: "PNET client comms lost" will be triggered. Ignore: Fault F63 will not be triggered.	SÍ

Subgroup 21.4.10: Client comms timeout

Screen	Range	Function	Set on RUN
G21.4.10 Client comms timeout = 4 s	1 to 60 s	Set timeout before client communications status changes to "Timeout".	SÍ

Subgroup G23.3: Communications

Subgroup G23.3 allows visualizing the status of communication between the COIN and the SD750.

- Warning 48: Communication COIN – SD750
- Fault 108: Communication COIN – SD750

Object Custom Modbus

This is a customized object, with a **single instance**. Each attribute represents a custom Modbus value (1 ... 32). Attributes 1 to 16 are read-only for the master (Get) and from 17 to 32 are write-only (Set).

Note: For the correct operation of this object, user must configure the custom parameters in groups G21.4.2 and G21.4.3 of the SD750. Attributes of the object Custom Modbus make use of these parameters, so the user is capable of configuring them with the variables from the SD750 drive that are most relevant to him.

Attribute ID	Name	Data type
1	Modbus Var 1	UINT
2	Modbus Var 2	UINT
3	Modbus Var 3	UINT
4	Modbus Var 4	UINT
5	Modbus Var 5	UINT
6	Modbus Var 6	UINT
7	Modbus Var 7	UINT
8	Modbus Var 8	UINT
9	Modbus Var 9	UINT
10	Modbus Var 10	UINT
11	Modbus Var 11	UINT
12	Modbus Var 12	UINT
13	Modbus Var 13	UINT
14	Modbus Var 14	UINT
15	Modbus Var 15	UINT
16	Modbus Var 16	UINT
17	Modbus Var 31	UINT

Attribute ID	Name	Data type
18	Modbus Var 32	UINT
19	Modbus Var 33	UINT
20	Modbus Var 34	UINT
21	Modbus Var 35	UINT
22	Modbus Var 36	UINT
23	Modbus Var 37	UINT
24	Modbus Var 38	UINT
25	Modbus Var 39	UINT
26	Modbus Var 40	UINT
27	Modbus Var 41	UINT
28	Modbus Var 42	UINT
29	Modbus Var 43	UINT
30	Modbus Var 44	UINT
31	Modbus Var 45	UINT
32	Modbus Var 46	UINT

FAULTS AND WARNINGS LIST

5

Please, consult the full list of fault and warning messages in the *Software and Programming Manual* for SD750 drives.

Fault list:

Screen	Possible cause	Actions
F63: PNET client comm lost	Reserved.	Contact with Power Electronics
F108: Expansion Profinet comm	Failure in communication with the Profinet board.	Verify the board is connected correctly. Consult with Power Electronics.
F110: Lost PNET c1 comms	Failure in communication with the connector 1 of the Profinet board.	
F111: Lost PNET c2 comms	Failure in communication with the connector 2 of the Profinet board.	
F124: Profinet IP Exp Version	The version of the expansion board is prior to 2.2.0.	Update the board's software to the latest available version.

Warning:

Warning	Acronym	Name	Description
W48	**PNE**	Profinet expansion	There is a communications problem with the Profinet board.

POWER ELECTRONICS

24H TECHNICAL ASSISTANCE 365 DAYS A YEAR

FIND YOUR NEAREST DELEGATION
POWER-ELECTRONICS.COM/CONTACT/