• 15G0176B400 •

SINUS H

VARIABLE FREQUENCY DRIVE

USER MANUAL

- Profibus-DP Communication Module -

Issued on 13/04/16
R.00
Software Version 32.41

English

- This manual is integrant and essential to the product. Carefully read the instructions contained herein as they provide important hints for use and maintenance safety.
- This device is to be used only for the purposes it has been designed to. Other uses should be considered improper and dangerous. The manufacturer is not responsible for possible damages caused by improper, erroneous and irrational uses.
- Enertronica Santerno S.p.A. is responsible for the product in its original setting.
- Any changes to the structure or operating cycle of the product must be performed or authorized by Enertronica Santerno S.p.A..
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Thank you for purchasing Sinus H Profibus-DP Communication Module

SAFETY PRECAUTIONS

- To prevent injury and danger in advance for safe and correct use of the product, be sure to follow the Safety Instructions.

- The instructions are divided as **'WARNING'** and **'CAUTION'** which mean as follow.

⚠	**WARNING**	**This symbol indicates the possibility of death or serious injury.**
⚠	**CAUTION**	**This symbol indicates the possibility of injury or damage to property.**

- The meaning of each symbol in this manual and on your equipment is as follows.

⚠	This is the safety alert symbol.
⚠	This is the dangerous voltage alert symbol.

- After reading the manual, keep it in the place that the user always can contact easily.
- Before you proceed, be sure to read and become familiar with the safety precautions at the beginning of this manual. If you have any questions, seek expert advice before you proceed. Do not proceed if you are unsure of the safety precautions or any procedure.

⚠ WARNING

- **Be cautious about dealing with CMOS elements of option board.**
  It can cause malfunction by static electricity.
- **Connection changing like communication wire change must be done with power off.**
  It can cause communication faulty or malfunction.
- **Be sure to connect exactly between Inverter and option board.**
  It can cause communication faulty or malfunction.
- **Check parameter unit when setting parameter.**
  It can cause communication faulty.

Table of Contents

Chapter 1. Introduction

This Profibus-DP communication module allows the Sinus H inverter to be connected to Profibus network.

1.1 What is Profibus-DP Communication Module?

A controlling and monitoring of inverter can be controlled by PLC sequence program of or a Profibus Master Module.
It helps the installation cost reduced since multiple inverters are implemented by one communication line. In addition, the wiring is so simple that the installation time will be reduced and the maintenance will be improved.
Factory automation can be also easily operated by Mixed-used development of auxiliary devices of PLC and other control systems such as PC for controlling the inverter.

1.2 Components

This product - P/N ZZ0176101 - is consisting of these kinds of parts:

- Profibus-DP Communication Module for Sinus H: 1 each
- Brass Bar(M3xL23): 1 each
- Brass Bar(M3xL17.3): 1 each
- Fixed Screw(M3xL8): 1 each
- Profibus connector: 1 each

Chapter 2. Profibus-DP Communication Module

2.1 Technical Specification of Profibus-DP Communication

Device Type	Profibus DP Slave
Auto Baud rate Detect	Supported
Synchronization Mode	Supported
Freeze Mode	Supported
Max. Input Length	8 words
Max. Output Length	8 words
Baud rate Support	9.6K, 19.2K, 93.75K, 187.5K, 500K, 1.5M, 3M, 6M, 12M
Modular Station	Supported
Max. Module	2
Max. Connectable Number of Nodes	Max. 32 nodes without repeater (including master module)
LED	3 LEDs (ONLINE, ERR, and CPU)
Communication Connector	9Pin D-sub

Table 1: Technical Data

2.2 Layout of Profibus-DP Communication Module

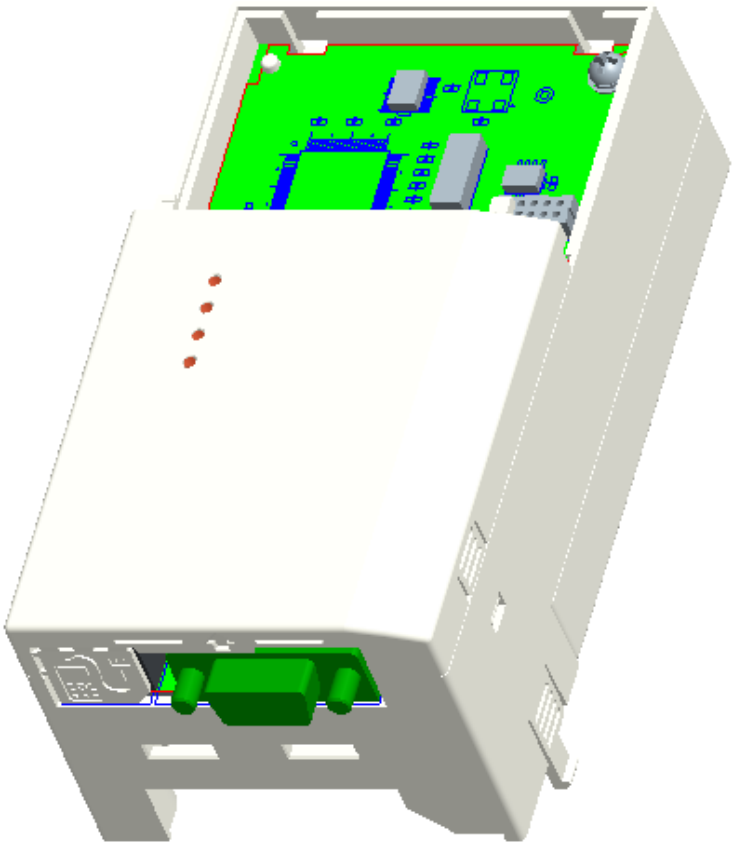


Figure 1: Profibus-DP Communication Module

2.3 General Specification of Profibus-DP Connector

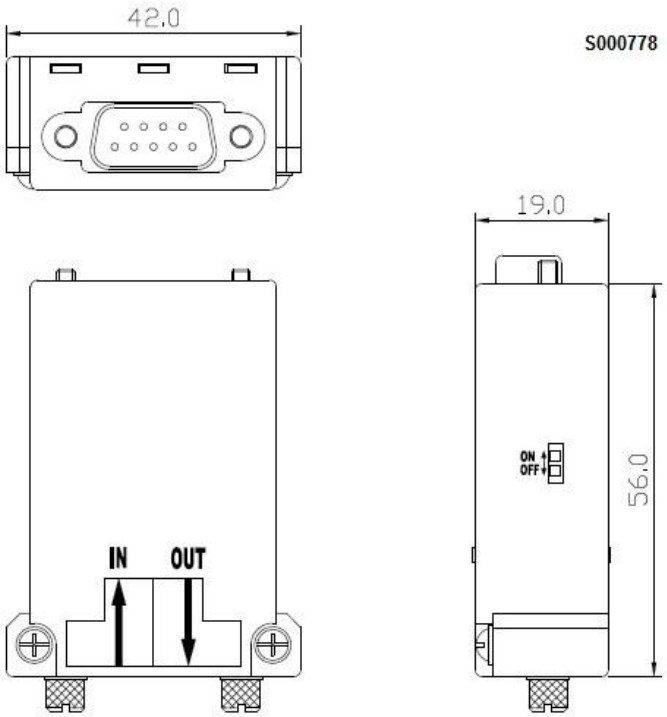
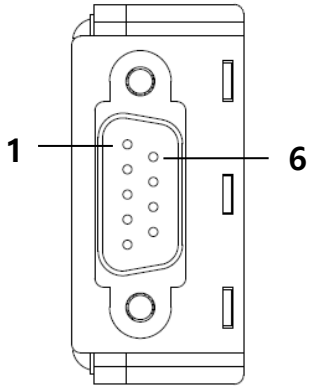


Figure 2: Profibus Connector

PROFIBUS Connector	Pin	Signal	Description
	1	None	None
	2	M24	24V output GND
	3	RxD/TxD-P	Transmitter/Receiver data Plus
	4	CTRL-P	Control signal for a repeater
	5	DGND	Signal GND
	6	VP	5V for terminating resistance
	7	P24	24V output Plus
	8	RxD/TxD-N	Transmitter/Receiver data Negative
	9	CTRL-N	Control signal for a repeater

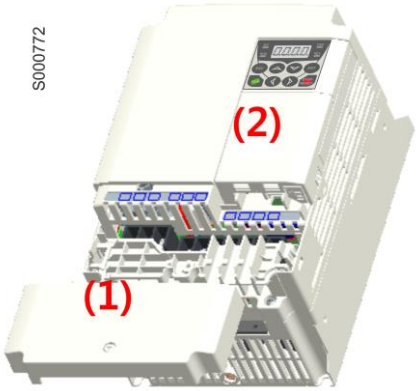
Note: The product only provides No.3, 5, 6 and 8 signals.

Table 2: Signal Description

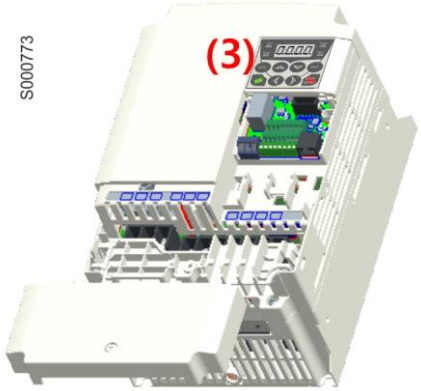
2.4 Installation

Warning: Connect a communication network after the power supply is off. If Profibus-DP communication module is removed or installed, the power supply should be switched off. Otherwise, the Sinus H inverter will be damaged entirely.
Take off Profibus-DP communication module from the product after the power supply is totally discharged.

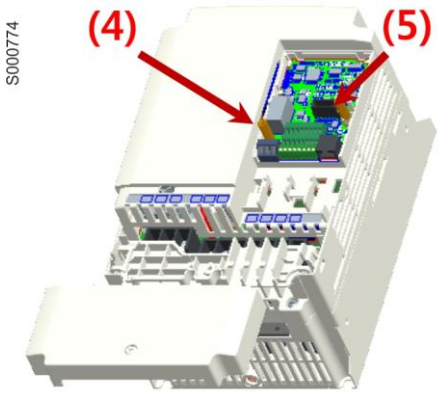
■ Unfasten the front cover fixing bolt to remove the front cover and remove I/O cover((1), (2)) from a dedicated inverter for communication.



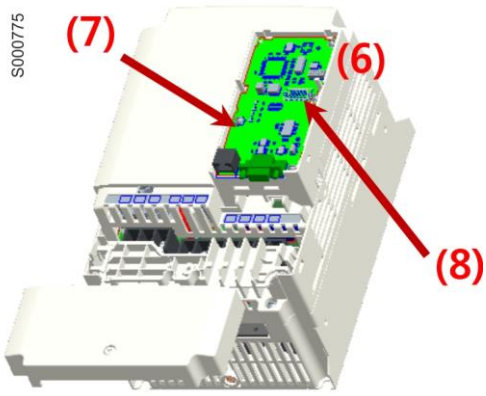
■ Remove the keypad (3).



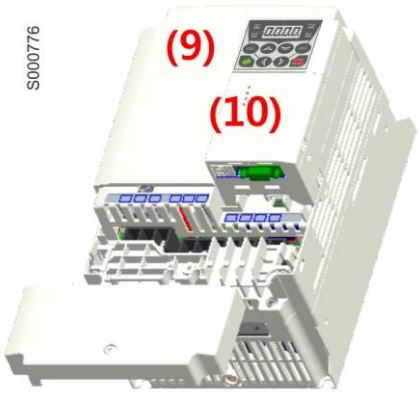
■ Unfasten a screw from I/O board and fasten the prepared brass bar (4) and (5).



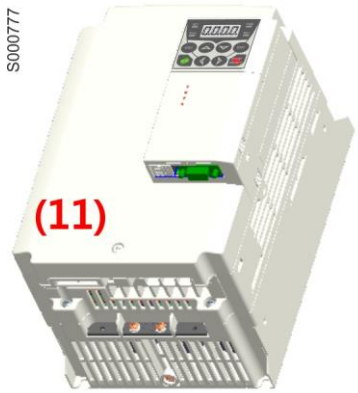
■ Mount Profibus-DP communication Module (6) and fasten the removed screw (7) and the included screw (8).



■ Install the keypad (9) at first and the communication module cover (10) in order.



■ Install the front cover (11) again And installation is completed.



2.5 Network Cable Specifications

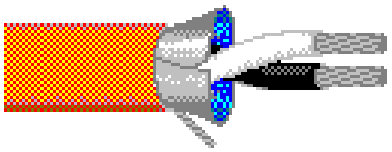
Classification	Description	
AWG	22	
Conductor Material	BC-Bare Copper	
Insulation Material	PE-Polyethylene	
Insulation Tension	0.035 inch	
Inner Shield Material	Aluminum Foil-Polyester, Tape/Braid Shield	
Electrostatic Capacity	8500pF/ft	
Specific Impedance	150Ω	
Total number of Conductors	2 Core	

Table 3: Network Cable Specifications

2.6 Maximum Distance according to the Baud rate

The total BUS length of a network configuration is differed according to the baud rate. The communication quality is not guaranteed when the total distance exceeds the total BUS length limit as below.

Baud rate	Max. Segment Length	Max. Extension Distance
12 Mbps	1,000 m / 3,278 feet	10,000 m / 32,786 feet
6 Mbps	1,000 m / 3,278 feet	10,000 m / 32,786 feet
3 Mbps	1,000 m / 3,278 feet	10,000 m / 32,786 feet
1.5 Mbps	1,000 m / 3,278 feet	10,000 m / 32,786 feet
500 kbps	400 m / 1,311 feet	4,000 m / 13,114 feet
187.5 kbps	200 m / 655 feet	2,000 m / 6,557 feet
93.75 kbps	100 m / 327 feet	1,000 m / 3,278 feet
19.2 kbps	100 m / 327 feet	1,000 m / 3,278 feet
9.6 kbps	100 m / 327 feet	1,000 m / 3,278 feet

Table 4: Maximum Distance according to the Baudrate

Chapter 3. Status Diagnostic and LED Indication

3.1 LED display feature

The Profibus DP Module has 3 kinds of LEDs, referring to the below table colored by LEDs for troubleshooting and diagnostics.

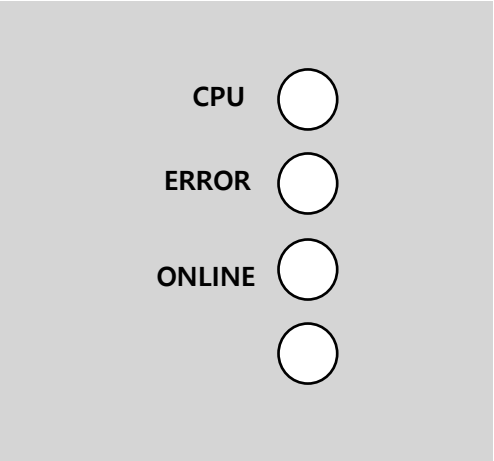


Figure 3: LED display

LED	Color	Description
CPU	Green	LED turns “On” when the communication module is installed on the inverter and the power is generated.
ERR	Red	LED turns “On” if there is something wrong in the Profibus-DP communication module.
ONLINE	Green	LED always turns “On” when Profibus-DP communication module is on-line status.

Table 5: LED Indication

3.2 LED information & Troubleshooting

LED	LED Status	Module Status	Cause	Troubleshooting
CPU	OFF	Failure in power supply	Power supply unplugged or contact failure between the inverter and Profibus-DP module.	Check power supply. Check the inverter's malfunction. Check the connection between Profibus-DP module and the connector of inverter.
	Blinking every second	Normal	Normal operation	-
ERR	OFF	Normal	Normal operation	-
	Blinking every 1 second (with CPU LED together)	The communication is interrupted.	The communication is not available between the inverter and the communication module.	Check inverter's malfunction. Check the connection between Profibus-DP module and the connector of inverter.

	Blinking every 1 second (contrary to CPU LED)	CONFIG ERROR	Master's configuration Data is different from Profibus-DP module's configuration.	Check the configuration data set on Master and the internal configuration data at the inverter.
ON-LINE	OFF	Off-Line	Master doesn't work for communication in the network.	Start the communication from Master.
			The connection of connector has a problem.	Check the connection between the pin number of connector and the termination resistor.
			There is no master in the network.	It can be possible there is no designated master or master has a problem.
			Wrong setting of station ID.	Check if the station ID set in the designated Profibus option module is the same as the station ID set

				from the keypad of inverter in Configuration tool and station ID is unique in the network.
			Network Configuration Fault.	Check if it exceeds the length limit of segment. Check if the connections with Segment are over 32 stations including a repeater. Check if the connections with network are over 126 stations including repeater.
	ON	On-Line	Network, Station, Parameterization and Configuration are normal.	-

Table 6: Diagnostics according to LED Status

Chapter 4. Inverter Parameter

4.1 Profibus-DP Communication Parameter List

Code Number	The name of Parameter	Initial Value	Range	Definition
CM-06	FBus S/W Ver	-	-	It indicates the version of Profibus-DP communication module.
CM-07	FBus ID	1	1 ~ 125	Set up the station of Profibus-DP module.
CM-09	FBus Led	-	-	Shows the ON/OFF data of the LED on Profibus-DP communication module.
CM-30	ParaStatus Num	3	0~8	Set up the Status number for use.
CM-31	Para Status-1	0x000A	0~0xFFFF	Set up Status address which will be read by Master.
CM-32	Para Status-2	0x000E	0~0xFFFF	
CM-33	Para Status-3	0x000F	0~0xFFFF	
CM-34	Para Status-4	0x0000	0~0xFFFF	
CM-35	Para Status-5	0x0000	0~0xFFFF	
CM-36	Para Status-6	0x0000	0~0xFFFF	
CM-37	Para Status-7	0x0000	0~0xFFFF	
CM-38	Para Status-8	0x0000	0~0xFFFF	
CM-50	Para Ctrl Num	2	0~8	Set up Control number for use.
CM-51	Para Control-1	0x0005	0~0xFFFF	Set up control address controlled by Profibus DP Master.
CM-52	Para Control-2	0x0006	0~0xFFFF	
CM-53	Para Control-3	0x0000	0~0xFFFF	
CM-54	Para Control-4	0x0000	0~0xFFFF	
CM-55	Para Control-5	0x0000	0~0xFFFF	
CM-56	Para Control-6	0x0000	0~0xFFFF	
CM-57	Para Control-7	0x0000	0~0xFFFF	

Code Number	The name of Parameter	Initial Value	Range	Definition
CM-58	Para Control-8	0x0000	0~0xFFFF	
CM-94	Comm Update	0	0:NO 1:YES	Update keypad parameters relating to communication.

Table 7: Inverter Parameters

4.2 Description of Profibus-DP Communication Parameters

4.2.1 Version of Communication module

It displays the version of Profibus-DP module installed on the inverter.

4.2.2 Station ID setting

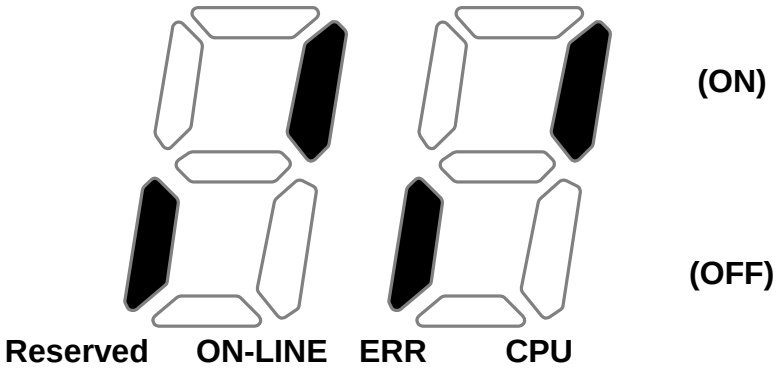
CM-07	FBus ID
CM-94	Comm Update

The parameter sets the value of Station ID at Profibus-DP module. Station ID can be set up within the range of 1~125 and it cannot be duplicated to write. It needs to check if the settled Station ID is not equal to other Station ID in network.
If the value of Station ID is changed, set ‘CM-94(Comm Update)’ to ‘1’ to apply the changed value of Station ID to Profibus-DP Communication module.

4.2.3 LED indication for communication status

Profibus-DP communication module have 3 LEDs, ONLINE, ERR, and CPU on the keypad in order from left to right. It indicates communication status by LED's On/Off.

(CM-05 Status Example)



Reserved	ON-LINE (GREEN)	ERR (RED)	CPU (GREEN)
OFF	ON	OFF	ON

4.2.4 The number of Para Status setting

CM-30	The number of Para Status setting
CM-31 ~ CM-38	Para Status1~Status8 setting
CM-94	Comm Update

This parameter determines that inverter sends how many status information to Master through Profibus-DP communication.
It can be set from 0 to 8. Para Status has to be set as the number of Para Status (From CM-31 to CM-38 as preset number).
For example, If CM-30 sets to '3', Para Status should be set from CM-31 to CM-33. If CM-30 sets to '6', Para Status should be set from CM-31 to CM-36.
If the number of Para status is changed, set 'CM-94(Comm Update)' to '1' to apply the changed number of Para Status to Profibus-DP Communication module.

4.2.5 Para Status 1~8

CM-30	Number of Para Status setting
CM-31 ~ CM-38	Para Status1~Status8 setting

It determines that what status information will be sent to Master through Profibus-DP communication.
Para Status 1~8 sets in the form of inverter address. It sets up the address for the common inverter area and the inverter keypad parameter. If the keypad parameter address is written, it will be saved in the form of 0x1000 + ('Group number' x 0x100) + ('Code number').

For example, if DI Status of No. 90 at n Group sets to Para Status-1, it should be set to 0x155A.
0x1000 + 0x05 x 0x100 + 0x5A(Dec 90) = 0x155A

Group	Group Number
dr Group	1
bA Group	2
Ad Group	3
Cn Group	4
In Group	5
OU Group	6
CM Group	7
AP Group	8
(Reserved)	9
(Reserved)	10
PRT Group	11
M2 Group	12

4.2.6 Number of Para Control setting

CM-50	Number of Para Control setting
CM-51 ~ CM-58	Para Control 1 ~ Control 8 setting
CM-94	Comm Update

It determines that Master sends how many control information to inverter through Profibus-DP communication.
It can be set up within the range of 0 to 8. Para Control has to be set as the number of Para Control. (From CM-51 to CM-58 as preset number)
For example, If CM-50 sets to ‘2’, Para Control sets from CM-51 to CM-52. If CM-50 sets to ‘5’, Para Control set from CM-51 to CM-55.
If the number of Para status is changed, set ‘CM-99(Comm Update)’ to ‘1’ to apply the changed number of Para Control to Profibus-DP communication module.

4.2.7 Para Control 1~8

CM-50	Number of Para Control setting
CM-51 ~ CM-58	Para Control 1~Control 8 setting

It determines that what control information will be sent to inverter through Profibus-DP communication.
Para Control 1 ~ 8 sets in the form of inverter address.
It sets up the address for the common inverter area and the inverter keypad parameter. If the keypad parameter address is written, it will be saved in the form of 0x1000 + ('Group number' x 0x100) + ('Code number').

For example, if Acc Time of No.3 at dr Group set to Para Control-1, it has to be set to 0x1103.
0x01 x 0x1000 + 0x01 x 0x100 + 0x03 (Dec 3) = 0x1103

Group	Group Number
dr Group	1
bA Group	2
Ad Group	3
Cn Group	4
In Group	5
OU Group	6
CM Group	7
AP Group	8
Reserved	9
Reserved	10
PRT Group	11
M2 Group	12

4.2.8 Comm Update

CM-07	Station ID setting
CM-30	The number of Para Status setting
CM-50	The number of Para Control setting
CM-94	Comm Update

After changing Station ID, the number of Para Status or the number of Para Control, set the Comm Update to ‘1’.
The changed value will be applied to Profibus-DP communication module after setting Comm Update to ‘1’.

Chapter 5. GSD File (Electronic Data Sheets)

The GSD file contains the information on the Profibus-DP communication module. The Profibus configuration software needs a GSD file.
You can download the GSD file from technical support in Enertronica Santerno website (http://santerno.com).