

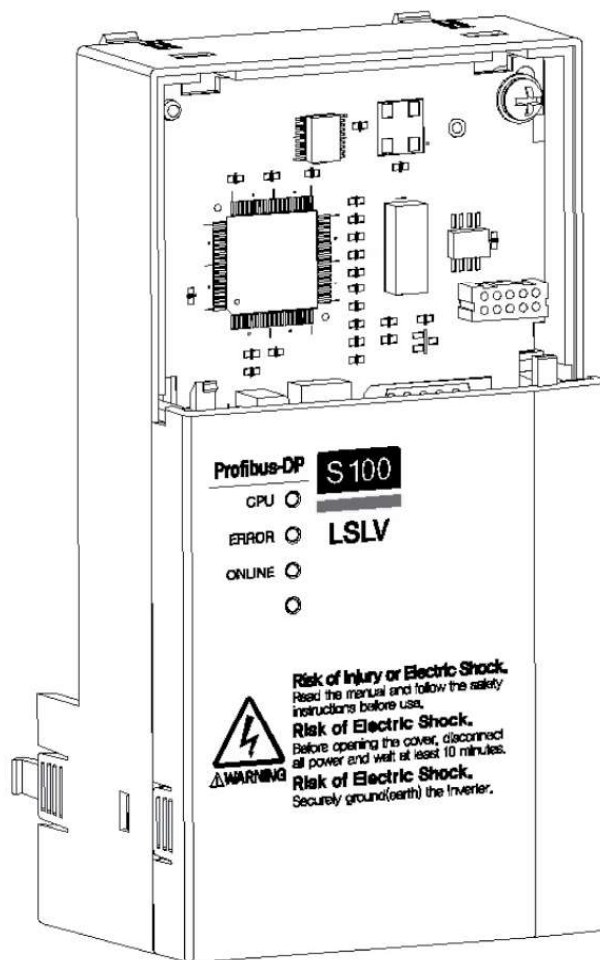
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# Profibus-DP Module

LSLV-S100 series

User's Manual



## Safety Instructions

- Read this manual carefully before installing, wiring, operating, servicing or inspecting this equipment.
- Keep this manual within easy reach for quick reference.

**LS**ELECTRIC

Before using the product  
Thank you for using the S100 PROFIBUS- DP module.

# Safety Information

- Always follow safety instructions to prevent accidents and potentially hazardous situations.
- Safety precautions are classified as “WARNING” and “CAUTION,” and their meanings are as follows:


## Warning


Indicates a potentially hazardous situation which, if not avoided, may cause death or serious injury.

## Caution

Indicates a potentially hazardous situation, which, if not avoided, may cause minor injury or damage to the product.

- Symbols used in this document and on the product indicate the following.

 Read and follow the instructions carefully to avoid dangerous situations.

 Presence of "dangerous voltage" inside the product that may cause harm or electric shock.

- Keep the operating instruction manual handy for a quick reference.
- Read this user manual carefully to fully understand the functions of the LSLV-S100 PROFIBUS-DP communication module and use it properly.

## Caution

- Be careful when handling CMOS elements in the communication module. Static charge may cause malfunction of the product.
- **Turn off the inverter before connecting communication cables.**  
Otherwise, the module may be damaged or a communication error may result.
- **Install the communication module correctly and make sure that it is firmly connected to the inverter.**  
Otherwise, the module may be damaged or a communication error may occur.
- **Check the parameter units when configuring the parameter values.**  
Otherwise, a communication error may occur.

# Table of Contents

<b>1 Overview</b> .....	<b>1</b>
1.1 What if the PROFIBUS-DP communication module is used?.....	1
1.2 Package components .....	1
<b>2 LSLV-S100 PROFIBUS-DP Communication Module</b> .....	<b>2</b>
2.1 LSLV-S100 PROFIBUS-DP Communication Technical Data .....	2
2.2 PROFIBUS- DP Communication Module Appearance .....	5
2.3 PROFIBUS- DP Communication Connector Specifications.....	6
2.4 Installation .....	7
2.5 Network Cable Specifications .....	10
2.6 Maximum distance depending on speed.....	10
2.7 Grounding option .....	11
<b>3 Operation Status and LED Indicators</b> .....	<b>13</b>
3.1 Definition of LED.....	13
3.2 Communication module status diagnosis according to LED status.....	14
<b>4 Inverter Parameters</b> .....	<b>16</b>
4.1 PROFIBUS- DP communication related parameter.....	16
4.2 PROFIBUS- DP communication-related parameters.....	17
4.2.1 Communication module version .....	17
4.2.2 Station ID setting .....	18
4.2.3 LED indication for communication status .....	18
4.2.4 Number of Para Status settings.....	19
4.2.5 Para Status 1~8.....	19
4.2.6 Number of Para Control settings .....	21
4.2.7 Para Control 1~8.....	21
4.2.8 Comm Update.....	22
4.2.9 Setting PROFIBUS Bit Swap .....	23
4.2.10 Profibus DP Telegram Type .....	23
4.2.11 Profibus DP Profile .....	24
4.2.12 Profibus DP Baudrate .....	24
4.2.13 Profibus DP Module Reset .....	25
4.2.14 Profibus DP PROFIdrive Value.....	25
<b>5 Communication Profile</b> .....	<b>26</b>
5.1 PROFIdrive Profile.....	27
5.1.1 Control word(STW1) .....	29
5.1.2 Status word(ZSW1) .....	30

## Table of Contents

5.1.3	Setpoint value .....	31
5.1.4	Actual speed value .....	31
5.2	I/O Profile .....	32
5.3	LS Drive Profile.....	32
5.3.1	Control word.....	33
5.3.2	Status Word .....	33
5.3.3	Setpoint value .....	34
5.3.4	Actual speed value .....	34
<b>6</b>	<b>Communication Protocol.....</b>	<b>35</b>
6.1	Cyclical message types .....	35
6.1.1	PPO Type .....	35
6.1.2	Standard Telegram1 .....	36
6.1.3	Vender Specific Telegram .....	37
6.2	Parameter Access .....	37
6.2.1	Cyclic Parameter data transfer (DP-V0) .....	37
6.2.2	Acyclic Parameter data transfer (DP-V1) .....	41
<b>7</b>	<b>PROFIdrive Parameters .....</b>	<b>46</b>
7.1	Supported Parameters.....	46
7.2	Description of PNU[944] Fault Message Counter and PNU[947] Fault Number.....	48
<b>8</b>	<b>I&amp;M records .....</b>	<b>51</b>
<b>9</b>	<b>GSD file (Electronic Data Sheets) .....</b>	<b>52</b>

# 1 Overview

The PROFIBUS-DP communication module allows the LSLV-S100 inverter to connect to a PROFIBUS network. This communication module does not support the IP66 product.

## 1.1 What if the PROFIBUS-DP communication module is used?

The sequence program on the PLC or any master module can control and monitor the inverter.

Because multiple inverters can be operated with one communication cable, this reduces the total installation cost. In addition, installation time is reduced and easy maintenance is made available because installation and routing of cables has become simpler. Factory automation can also be easily implemented by linking various auxiliary devices with a PLC and by utilizing other control systems, such as a PC, for controlling the inverter.

## 1.2 Package components

The product package includes the following components:

- PROFIBUS- DP communication module (CPDP-S100): 1 ea.
- User manual: 1 ea.
- Brass bar (M3xL23): 1 ea.
- Brass Stick (M3xL17.3): 1 ea.
- Screw (M3xL8): 1 ea.
- PROFIBUS connector: 1 ea.

## 2 LSLV-S100 PROFIBUS-DP Communication Module

### 2.1 LSLV-S100 PROFIBUS-DP Communication Technical Data

Device Type	PROFIBUS-DP Slave
Auto Baud Rate Detect	Supported
Sync Mode	Supported
Freeze Mode	Supported
Max Input Length	8 words
Max Output Length	8 words
Baud Rate Support	9.6K, 19.2K, 45.45K, 93.75K, 187.5K, 500K, 1.5M, 3M, 6M, 12M
Modular Station	Supported
Max Module	2
Max. Number of Nodes	Max. 32 nodes without a repeater (including the master node)
LED	Three LEDs (ONLINE, ERR, and CPU)
Communication connector	9Pin D-sub

**Table 1 Technical Data**

Items		Description	
DP version		DPV0(Legacy)	DPV1
function	Cyclic data MS0	Cyclical Data Exchange	Cyclical Data Exchange
		Global Control Service	Global Control Service
		Read Configuration Data	Read Configuration Data
		Read Diagnostic Data	Read Diagnostic Data
		Send Parameter Data	Send Parameter Data
		Configuration Data	Configuration Data
	Acyclic data MS1	x	Read, Write, Alarm
Acyclic data MS2	x	Read, Write	

Items	Description	
Profile	I/O Profile (LS Define Profile)	I/O Profile(LS Define Profile), PROFIdrive profile, LS Drive Profile
Telegram	x	ST1, PPO Type
PNU Parameter	x	918 - PROFIBUS address
		922 - Telegram selection
		944 - Error message counter
		947 - Error number
		963 - PROFIBUS baud rate
		964 - Device identification
		965 - PROFIdrive profile number
Integration	GSD_Revision = 1	GSD_Revision = 5, I&M0
Support Model Criteria	Ver. 2.01 or lower	ver 3.00

**Table 2 Specific technical data for Profibus application**

Only DPV0 mode is supported up to version 2.01 or lower, which is an existing legacy product. The mode only supports simple Input/Output communication and does not support additional protocol services, except for services for basic connection setup.

Starting with the newly supported version 3.00, DPV0/DPV1 mode is supported, and Telegram, PNU parameters, and profiles for drive control are added.

See the LS ELECTRIC homepage below for more information on ver. 2.01.

[www.ls-electric.com](http://www.ls-electric.com) -> Download Center -> iS7 Profibus Option Manual

## LSLV-S100 PROFIBUS-DP Communication Module

The DP versions supported by LS Profibus-DP master module are as follows:

Items		Description	Remark
XGK/XGI/XGR common	XGL-PMEA	Profibus-DP Master	Supports DP-V0
	XGL-PMEC	Profibus-DP Master	
	XGL-PMEB	Profibus-DP Master	Supports DP-V0 and DP-V1

## 2.2 PROFIBUS- DP Communication Module Appearance

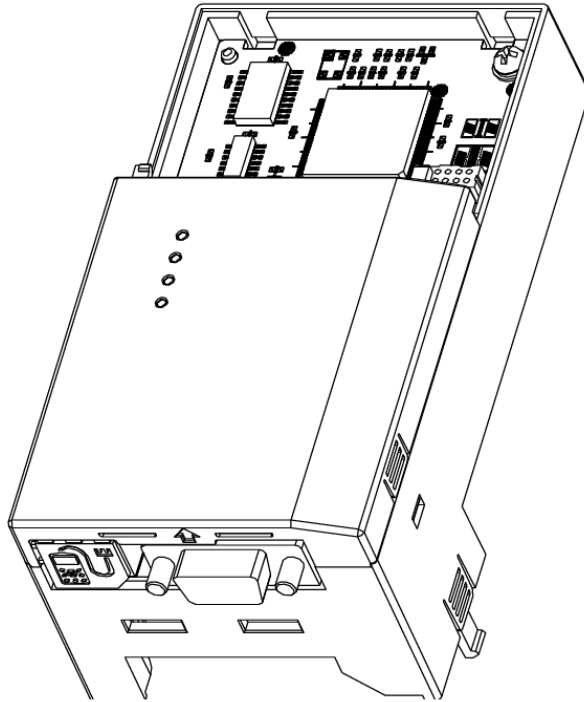


Figure 1 PROFIBUS-DP Communication Module

## 2.3 PROFIBUS- DP Communication Connector Specifications

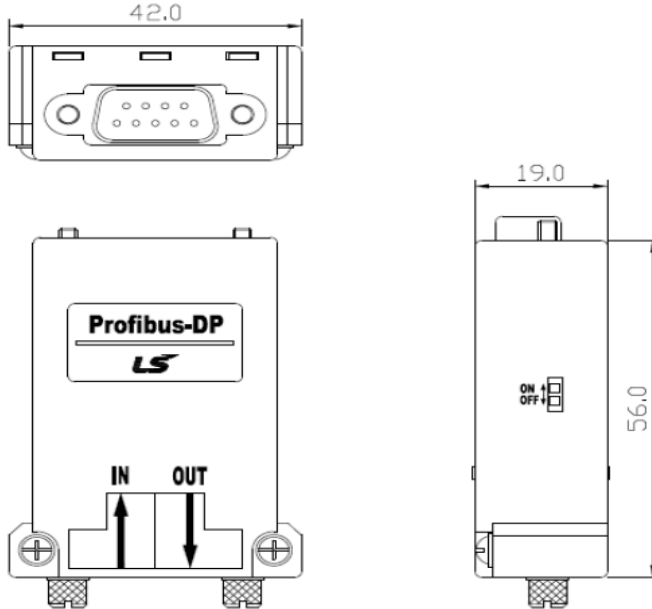


Figure 2 PROFIBUS Connector

PROFIBUS Connector	Pin	Signal	Description
	1	None	None
	2	M24	24 V Output GND
	3	RxD/TxD-P	Received/Transmitted Data Plus
	4	CTRL-P	Control signal for a repeater
	5	DGND	Signal GND
	6	VP	5 V for termination resistance
	7	P24	24 V Output - Positive
	8	RxD/TxD-N	Received/Transmitted Data - Negative
	9	CTRL-N	Control signal for a repeater

Note) The product supports signal pins 3, 5, 6, and 8 only.

Table 3 Definition of Signals

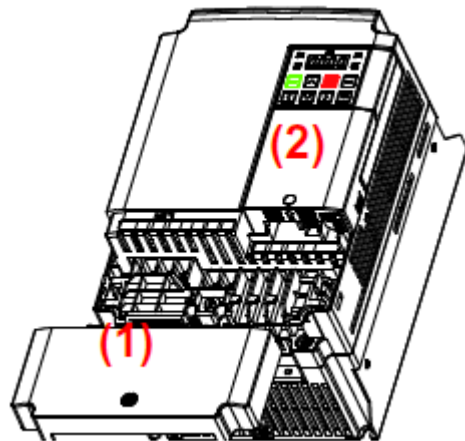
## 2.4 Installation

### ⚠ Warning

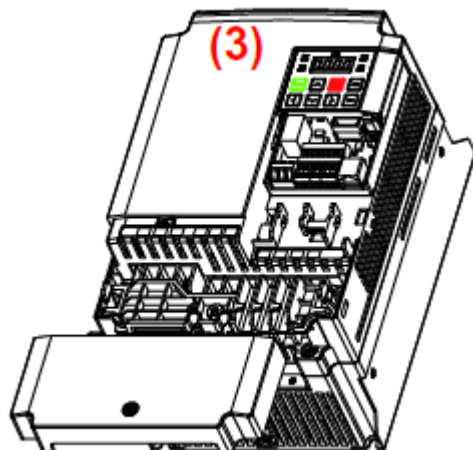
**Turn off the inverter before configuring the communication network.**

Both the inverter and the communication module will be damaged if the communication module is installed or removed while the inverter is on. Install or remove the communication module after the capacitor inside the inverter is completely discharged.

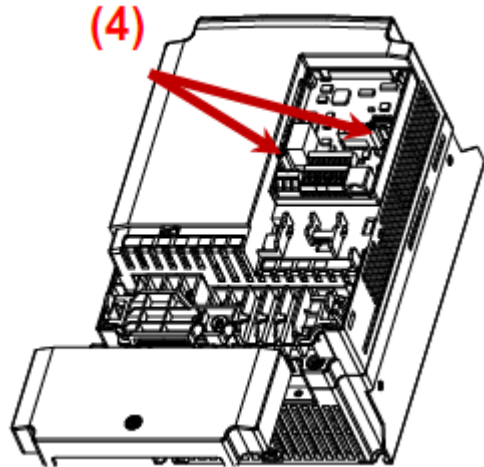
- 1 After turning OFF the inverter power, remove the power cover (1) and then remove the I/O cover (2) to open the I/O cover.



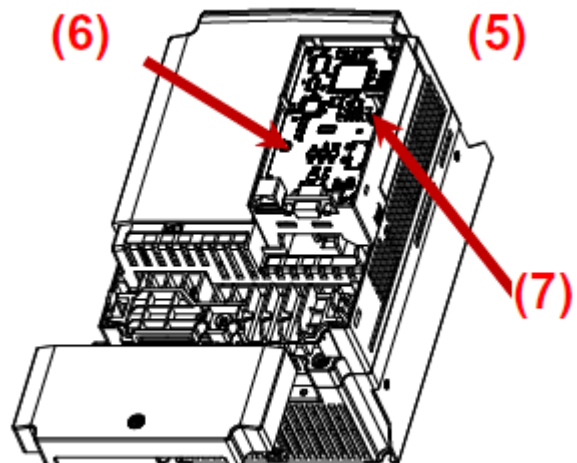
- 2 Remove the keypad (3).



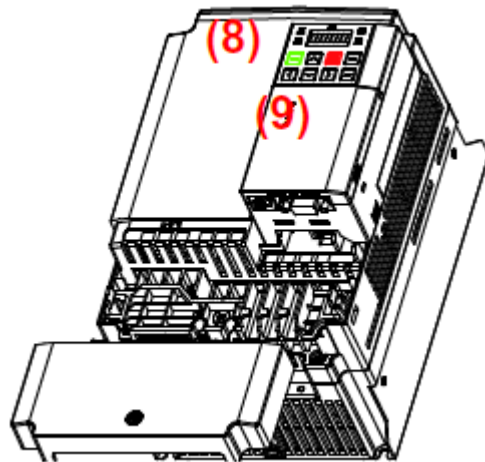
- 3 Remove the screws (4) on the I/O board and fasten the enclosed brass bar (4).



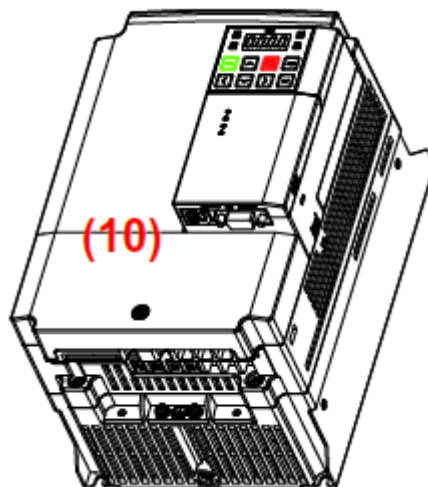
- 4 Fasten the communication module (5) and fasten the screw (6) removed from the I/O board and the enclosed screw (7).



- 5 Reinstall the keypad (8) first, then reinstall the communication module covers (9) in order.

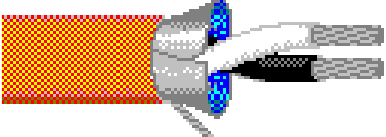


- 6 Reinstall the power cover (10). The inverter is ready for use.



## 2.5 Network Cable Specifications

Item	Description
AWG	22
Cable Type	BC-Bare Copper
Insulation	PE-Polyethylene
Insulation Thickness	0.035 inch
Shield	Aluminum Foil-Polyester, Tape/Braid Shield
Electrostatic Capacity	8500pF/ft
Characteristic Impedance	150Ω
Number of Conductors	2 Cores



**Table 4 Network Cable Specifications**

## 2.6 Maximum distance depending on speed

The total length of a network cable configuration varies depending on the baud rate. The communication quality cannot be guaranteed if the total network cable length exceeds the following cable length limits.

Communication rate	Max. Segment Length	Max. Extension Length
9.6 kbps	1000 m / 3278 feet	10000 m / 32786 feet
19.2 kbps	1000 m / 3278 feet	10000 m / 32786 feet
45.45 kbps	1000 m / 3278 feet	10000 m / 32786 feet
93.75 kbps	1000 m / 3278 feet	10000 m / 32786 feet
187.5 kbps	1000 m / 3278 feet	10000 m / 32786 feet
500 kbps	400 m / 1311 feet	4000 m / 13114 feet
1.5 Mbps	200 m / 655 feet	2000 m / 6557 feet
3 Mbps	100 m / 327 feet	1000 m / 3278 feet
6 Mbps	100 m / 327 feet	1000 m / 3278 feet
12 Mbps	100 m / 327 feet	1000 m / 3278 feet

**Table 5 Maximum distance depending on communication rate**

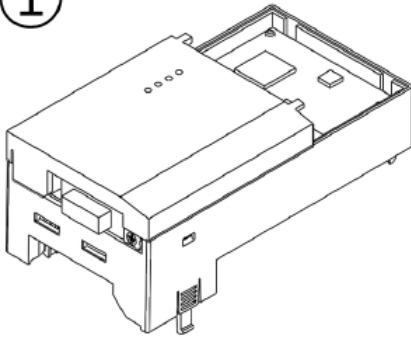
## \* Special requirements for using transmission rate greater than 1.5 Mbps

- A special connector with a built-in inductor is required to use a transmission rate of 1.5 Mbps or higher.
- Spurline is not allowed when using a transmission rate greater than 1.5 Mbps.
- The maximum segment length is 100 m.
- The minimum cable length between each node must be greater than 1 m.

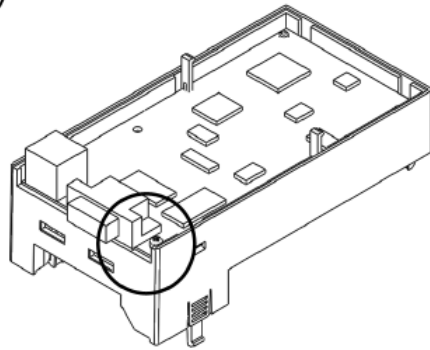
## 2.7 Grounding option

When using a ground for the communication cable (shielded cable), connect as follows: The ground cable is not included in the product package.

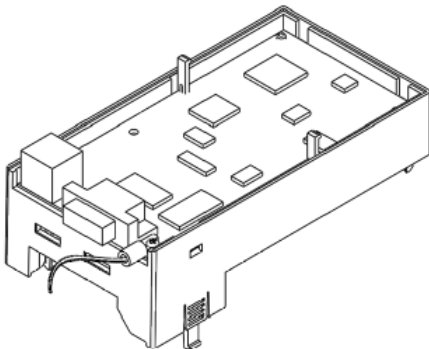
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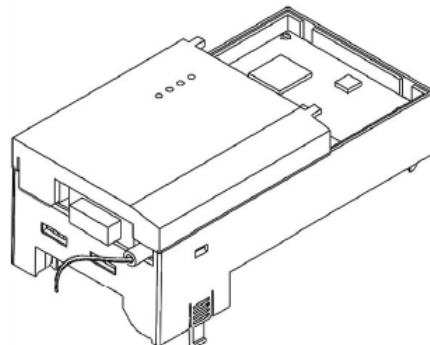
②



③



④





## LSLV-S100 PROFIBUS-DP Communication Module

- 1 Remove the communication option cover.
- 2 Remove the ground mold (pull shape) of the communication option cover.
- 3 Connect the ground wire using a screw to the bottom \*right of the communication option.
- 4 Close and assemble the communication option cover.

Connect the ground (CM) of the communication option separately from the ground of the inverter. Remove the communication option cover.

\* See the ground part.

Screw size	Lug type		Recommended wiring thickness [mm <sup>2</sup> ](AWG)	screw torque [kgf.cm]
M3x8	Circular or Y-type	 	Complies with the lug specification	5.3

## 3 Operation Status and LED Indicators

### 3.1 Definition of LED

The PROFIBUS DP communication module has 3 LED indicators.

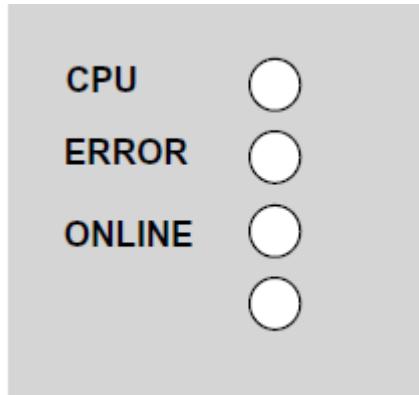


Figure 3 LED Silk Printing

LED	Color	Description
CPU	Green	Flashes when the communication module is installed to the inverter and the power is supplied.
ERROR	Red	Flashes when a PROFIBUS-DP communication module error is detected.
ONLINE	Green	It is always on when PROFIBUS-DP communication is in online.

Table 6 Definition of LED

### 3.2 Communication module status diagnosis according to LED status.

LED	Status	Operation Status	Cause	Resolution
CPU	Off	Power supply failure	Power has not been provided to the inverter or the PROFIBUS-DP communication module has not been properly installed to the inverter.	Check the power supply to the inverter. Check if the inverter has tripped. Check the connection between the PROFIBUS-DP communication module and the inverter.
	Flashes In 1-sec interval	Normal	Normal operation	
ERROR	Off	Normal	Normal operation	
	Flashes In 1-sec interval (Synchronously with the CPU LED)	Communication error between the module and the inverter	Communication is not available between the inverter and the communication module.	Check if the inverter has tripped. Check the connection between the PROFIBUS-DP communication module and the inverter.
	Flashes In 1-sec interval (CPU LED)	CONFIG ERROR	While the module is online in master, the master's configuration data is different from the PROFIBUS-DP communication module's configuration data(Configuration data refers to the number of status and control data)	Check the configuration data set with the master device and the internal configuration data at the inverter.
	Single Flash 0.2s ON / 0.8s OFF	EEPROM error	Option internal EEPROM data read failed immediately after power is applied	Contact our company's A/S.
	Double Flash 0.2s ON /0.2s OFF /0.2s ON /0.4s OFF	LOST COMMAND	With the lost command set, the communication connection with the master failed.	See Help for "ON-LINE LED OFF" status

LED	Status	Operation Status	Cause	Resolution
	ON	Fault occurred	Fault from the inverter occurred.	Check inverter fault history.
ON-LINE	Off	Off-Line	The master device has not started network communication in the network.	Start the network communication from the master device.
			There is a problem with the communication cable connection.	Check the pin number of the connector for the correct orientation of the cable connection and check the termination resistor configuration.
			A master device does not exist in the network.	A master device has not been assigned, or the master device's station ID has been set incorrectly.
			Station ID has been set incorrectly.	In the configuration tool, check if the station ID assigned for the communication module is identical to the station ID set from the inverter using the keypad input. Then, make sure that the station ID is not duplicated in the network.
	Network Configuration Error	Check if the network cable length of the segment exceeds the maximum allowed length. Check if the segment has over 32 stations (including a repeater). Check if the network has over 126 stations (including a repeater).		
	On	On-Line	All settings (network and station ID settings, parameters, and configuration) are normal.	

**Table 7 LED Status Diagnostics**

## 4 Inverter Parameters

### 4.1 PROFIBUS- DP communication related parameter

Code Number	Parameter Name	Default	Setting Range	Description
COM-06	FBus S/W Ver	-	-	Indicates the version of the communication module installed to the inverter.
COM-07	FBus ID	1	1 ~ 125	Sets up the station ID for the PROFIBUS-DP communication module.
COM-09	FBus Led	-	-	Shows the LED status on the PROFIBUS-DP Communication module.
COM-10	Profibus DP Telegram Type	1	1,100~106	Indicates the Telegram type of the Profibus DP communication module. Means PROFIdrive parameter No.922. (Read only)
COM-11	Profibus DP Profile	1	0~2	Indicates the operation profile of the Profibus DP communication module. Means PROFIdrive parameter No.930. (Read only)
COM-12	Profibus DP Baudrate	255	0~11	Indicates Baud rate of the Profibus DP communication module. Means PROFIdrive parameter No.963. (Read only)
COM-13	Profibus DP Module Reset	0	0-1	Means PROFIdrive parameter No.972.
COM-14	Profibus DP PROFIdrive value	0	0-1	Indicates the value definition of the setpoint value and actual speed value used in the PROFIdrive profile.
COM-30	Para Status Num	3	0~8	Set up the number of status for use.
COM-31	Para Status-1	0x000A	0~0xFFFF	Set up the status address to be read by the master device.
COM-32	Para Status-2	0x000E	0~0xFFFF	

Code Number	Parameter Name	Default	Setting Range	Description	
COM-33	Para Status-3	0x000F	0~0xFFFF		
COM-34	Para Status-4	0x0000	0~0xFFFF		
COM-35	Para Status-5	0x0000	0~0xFFFF		
COM-36	Para Status-6	0x0000	0~0xFFFF		
COM-37	Para Status-7	0x0000	0~0xFFFF		
COM-38	Para Status-8	0x0000	0~0xFFFF		
COM-50	Para Ctrl Num	2	0~8		Set up the number of control for use.
COM-51	Para Control-1	0x0005	0~0xFFFF		Set up the address for the controls to be controlled by the master device.
COM-52	Para Control-2	0x0006	0~0xFFFF		
COM-53	Para Control-3	0x0000	0~0xFFFF		
COM-54	Para Control-4	0x0000	0~0xFFFF		
COM-55	Para Control-5	0x0000	0~0xFFFF		
COM-56	Para Control-6	0x0000	0~0xFFFF		
COM-57	Para Control-7	0x0000	0~0xFFFF		
COM-58	Para Control-8	0x0000	0~0xFFFF		
COM-68	FBus Swap Sel	0	0 – 1	0 : NO    1 : Swap	
COM-94	Comm Update	0	0:NO 1:YES	Update keypad parameters related to network communication.	
DR-20	Max Freq	60.00	40.00 ~ 400.00	Indicates the maximum frequency, which is the value apply reference for the Profibus DP PROFIdrive value.	

Table 8 Inverter parameters

## 4.2 PROFIBUS- DP communication-related parameters

### 4.2.1 Communication module version

CM-06 is used to display the version of PROFIBUS-DP communication module installed on the inverter.

### 4.2.2 Station ID setting

The following parameters are used to set the station ID for the PROFIBUS-DP communication module.

COM-07	FBus ID
COM-94	Comm Update

The parameters above are used to set the Station ID for the PROFIBUS-DP communication module. A station ID can be set to a value within a range of 1–125.

The station ID cannot be duplicated. Make sure the same station ID is not used by another module in the network.

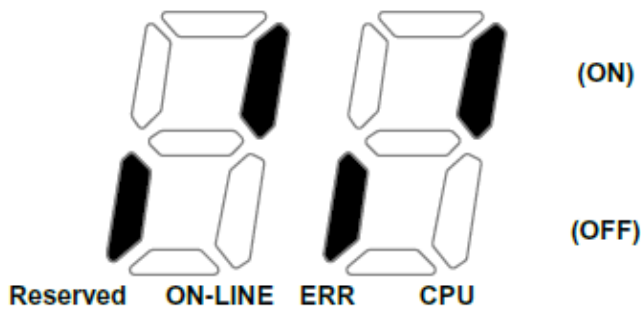
After changing the Station ID, you must set COM-94 (Comm Update) to 1 to apply the change to the PROFIBUS-DP communication module.

### 4.2.3 LED indication for communication status

CM-09 is used to indicate the operation status of the three LED indicators (ONLINE, ERR, and CPU) on the PROFIBUS-DP communication module.

On the keypad display, the status of the three LED indicators are displayed, in an order of blank (reserved), ONLINE, ERR, and CPU, from right to left.

(Example of an LED indicator status expressed with COM-05)



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

#### 4.2.4 Number of Para Status settings

COM-30	Number of Para Status settings
COM-31 ~ COM-38	Para Status 1–8 settings
COM-94	Comm Update

The parameters above are used to determine how much Para Status data will be sent to the master device by the inverter through PROFIBUS-DP network communication.

The number of the Para Status can be set to a number between 1 and 8.

The Para Status (as many as the number of COM-31 to COM-38) should be set as many as the Para Status. If COM-30 is set to 3, COM-31 to COM-33 should be set, and if COM-30 is set to 6, also COM-31 to COM-36 should be set.

After changing the number of Para Status, you must set COM-94 (Comm Update) to 1 to apply the changes to the PROFIBUS-DP communication module.

#### 4.2.5 Para Status 1~8

COM-30	Number of Para Status settings
COM-31 ~ COM-38	Para Status 1–8 settings

The Para Status setting defines which status information will be sent to the master device through PROFIBUS-DP network communication.

Para Status 1–8 are set in the form of inverter address.

The inverter's common area and keypad parameter addresses are used as the setting values.

The keypad parameter addresses can be expressed according to the following formula:  $0x1000 + (\text{Group number} * 0x100) + (\text{Code number})$ .

## Inverter Parameters

For example, if you want to set the inverter In Group's number 90 DI Status to Para Status-1, you can set it to 0x155A.

$$0x1000 + 0x05 \times 0x100 + 0x5A(\text{Dec } 90) = 0x155A$$

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 settings

COM-50	Number of Para Control settings
COM-51 ~ COM-58	Para Control 1–8 settings
COM-94	Comm Update

The parameters above are used to determine how much Para Control data will be sent to the master device by the inverter through PROFIBUS-DP network communication.

The number of the Para Control can be set to a number between 1 and 8.

The Para Control (as many as the number of COM-51 to COM-58) should be set as many as the number of the Para Controls. If COM-50 is set to 2, COM-51 to COM-52 should be set, and if C50 is set to 5, COM-51 should be set to C55.

After changing the number of Para Control, you must set COM-94 (Comm Update) to 1 to apply the changes to the PROFIBUS-DP communication module.

## 4.2.7 Para Control 1~8

COM-50	Number of Para Control settings
COM-51 ~ COM-58	Para Control 1–8 settings

The Para Control setting defines which control information will be sent to the master device through PROFIBUS-DP network communication.

Para Control 1–8 are set in the form of an inverter address.

The inverter's common area and keypad parameter addresses are used as the setting values.

The keypad parameter addresses can be expressed according to the following formula:  $0x1000 + (\text{Group number} * 0x100) + (\text{Code number})$ .

For example, if you want to set the third acceleration time of the inverter dr Group to Para Control-1, you can set it to 0x1103.

$$0x01 \times 0x1000 + 0x01 \times 0x100 + 0x03 \text{ (Dec 3)} = 0x1103$$

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

COM-07	Station ID setting
COM-30	Number of Para Status settings
COM-50	Number of Para Control settings
COM-94	Comm Update

After changing the Station ID, and the number of Para Status and Para Control, you must set the CM-94 (Comm Update) to 1 to apply the changes.

The new setting values will be applied to the PROFIBUS-DP communication module only after CM-94 (Comm Update) is set to 1.

## 4.2.9 Setting PROFIBUS Bit Swap

Set whether the LSB and MSB bit swaps of data transmitted during communication.

(Set if the parent controller reads the LSB and MSB in the Profibus option data in reverse.)

	Set value	Location on KeyPad
FBus Swap Sel	0 : No 1 : Yes	68 in COM Group

## 4.2.10 Profibus DP Telegram Type

Displays the Telegram Type set in the communication module. The parameters cannot be changed on the keypad, but can only be changed on the master. Indicates the I/O configuration of the cyclic message to and from the master, and the meaning of each value is as follows:

	Display value	Value Meaning
COM-10	1	Standard Telegram 1
	100	Vender Specific Telegram
	101	PPO Type 1 (PKW 4/4 + PZD 2/2)
	102	PPO Type 2 (PKW 4/4 + PZD 6/6)
	103	PPO Type 3 (PZD 2/2)
	104	PPO Type 4 (PZD 6/6)
	105	PPO Type 5 (PKW 4/4 + PZD 10/10)
	106	PPO Type 6 (PZD 10/10)

The I/O Word data size set in the Vendor Specific Telegram follows the Para Status Num and Para Control Num settings.

The values of Para Status Num (COM-30) and Para Control Num (COM-50) may be automatically changed according to the corresponding values determined by the master.

### 4.2.11 Profibus DP Profile

Displays the control operation mode for inverter operation. The parameter cannot be changed from the keypad by default, but it can be set by the keypad when using Telegram Type: 101-106 in the master. After changing to the keypad, the COM-94 com update is required to apply the corresponding values. The control operation mode shows the operation mode status set by the master, and the meaning of each value is as follows:

	Set value	Value Meaning	Remark
COM-11	0	I/O Profile	Telegram type: Automatically specified when using 100.
	1	PROFIdrive Profile	Telegram type: Automatically specified when using 1.
	2	LS Drive Profile	Telegram type: Available when using 101-106.

### 4.2.12 Profibus DP Baudrate

Displays the Baud rate of the Profibus example set by the current master. The parameters cannot be changed on the keypad, but can only be changed on the master. Indicates the value specified when the Profibus DP is running on the master, and the meaning of each value is as follows:

	Display value	Value Meaning
COM-12	0	9.6 kbit/s
	1	19.2 kbit/s
	2	93.75 kbit/s
	3	187.5 kbit/s
	4	500 kbit/s
	6	1.5 Mbit/s
	7	3 Mbit/s
	8	6 Mbit/s
	9	12 Mbit/s
	11	45.45 kbit/s
	255	Invalid baud rate

### 4.2.13 Profibus DP Module Reset

Parameter for initializing the PROFIdrive parameter value of the communication option to zero. As soon as the corresponding value is set to 1, the values of p944, p947, and p953 to be initialized are initialized to 0.

	Set value	Remark
COM-13	0 -> 1	As soon as the corresponding value is set to 1, the values of p944, p947, and p953 to be initialized are initialized to 0.

### 4.2.14 Profibus DP PROFIdrive Value

Parameter used when the value applied in the COM-11 Profibus DP profile is set to PROFIdrive Profile (1). After changing to the keypad, the COM-94 com update is required to apply the corresponding values. This parameter represents the definition of the value used in the setpoint value and actual speed value area.

	Set value	Value Meaning	Remark
COM-14	0	PROFIdrive Standard	Indicates NSOLL_A, NIST_A (16 bits), and the reference point for that value is DRV-20 Max Freq. The range is 0xC000 (-100%) to 0x4000 (100%).  Ex) $DRV-20(60.00\text{hz}) * 0x4000(100\%) =$ Forward Target Frequency Value(60.00hz)  $DRV-20(60.00\text{hz}) * 0xF000(-25\%) =$ Reverse Target Frequency Value(15.00hz)
	1	Vendor Specification	Indicates the RPM (decimal) value itself.

# 5 Communication Profile

The communication profile represents the control commands (such as control word, status word, references, and actual values) between the master and slave (inverter). Data transmission between the PROFIBUS DP master and the slave is performed through the IN/OUT data field. The master controls the data by recording it in the OUT data of the slave (inverter) and the slave (inverter) responds by delivering the content of the IN data to the master.

This communication supports I/O profile, PROFIdrive profile, and LS Drive profile. The meaning of input/output data varies depending on each profile.

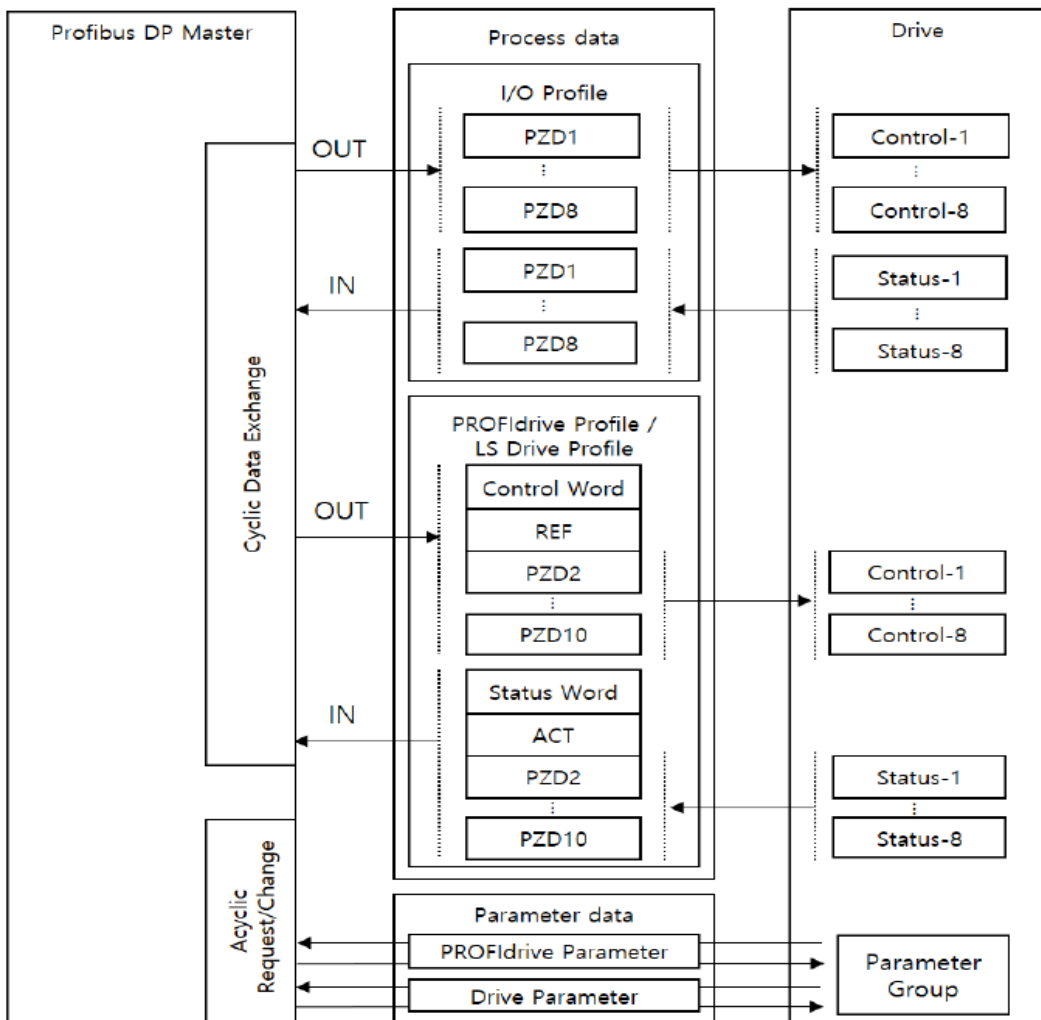


Figure 4. Data Transfer between PROFIBUS DP Master and Drive

The Profibus DP communication module can be used in combination with process data and parameter data, depending on the use of the profile and telegram.

### Process data

- Process data OUT : For controlling drive
- Process data IN : Is used for fast monitoring of the drive

### Parameter data

- Used for Write/Read parameters and variables.
- Available only when the device is configured to use PPO1, PPO2, or PPO5.
- Also can be used with DP-V1 Function

Process data is divided into I/O profile, PROFIdrive profile, and LS Drive profile depending on the profile usage. PROFIdrive profile and LS Drive profile are control profiles for standardized speed control mode, and I/O profile is a method of accessing and controlling its parameters without standardized control mode.

Parameter data is a service that periodically requests/responds to specific parameters. This service method provides access to PROFIdrive parameters and the product's own drive parameters. Parameter access methods for parameter data are divided into cyclic parameter data transfer and acyclic parameter data transfer method.

## 5.1 PROFIdrive Profile

According to the PROFIdrive profile, the control word (PROFIdrive parameter 967) is used by the control system, and the status word (PROFIdrive parameter 968) indicates the status changed by the control word. Access to control parameters (0h0005, 0h000A, 0x0381, and 0x0015), such as inverter self-operation control and target frequency, is not recommended when using this PROFIdrive profile. See Figure 5 for state machine information.

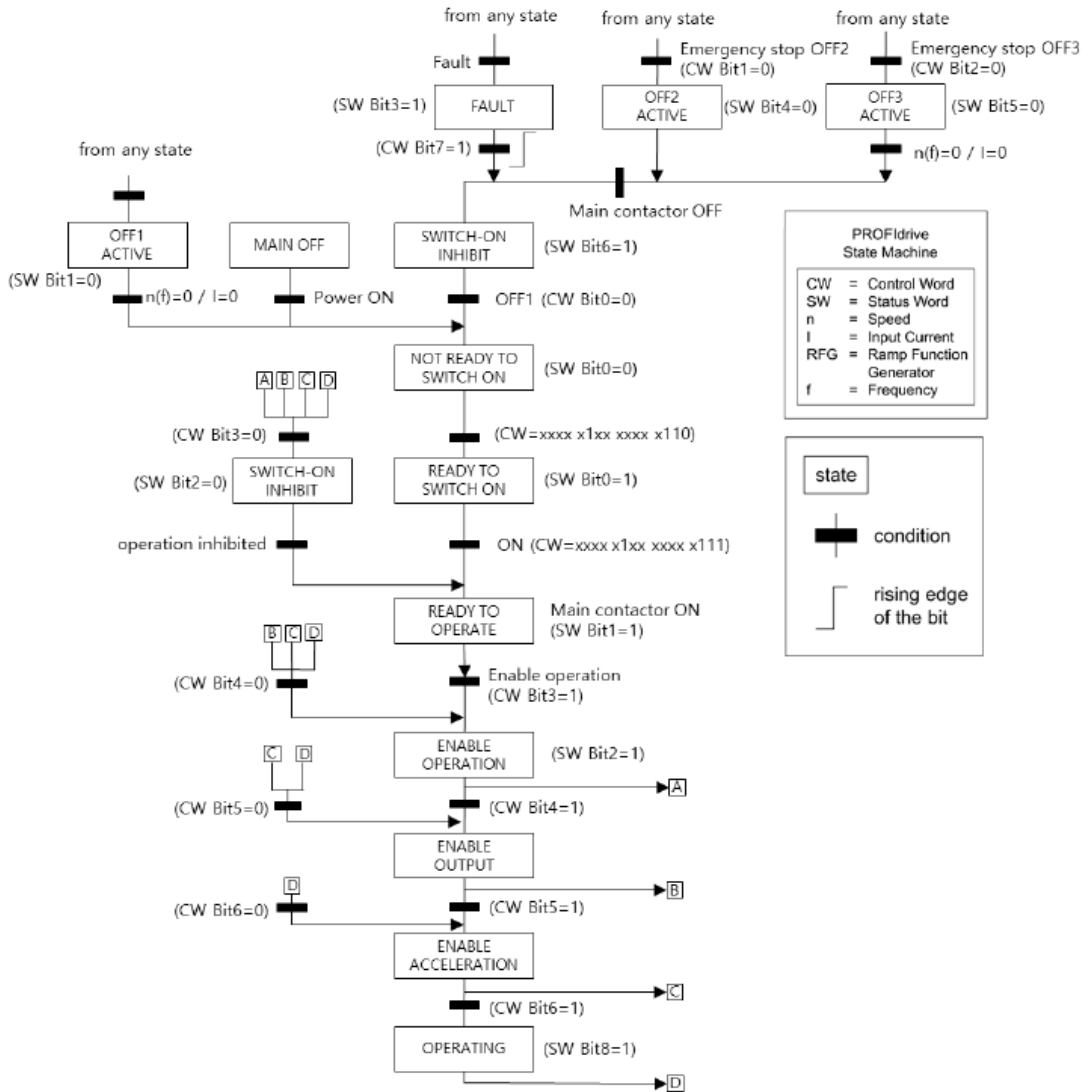


Figure 5. PROFdrive State machine

Details of the control word and status word used in the status chart above are as follows:

### 5.1.1 Control word(STW1)

Bit	Name	Value	Description
0	ON	1	Ready to operation (Operational status by PLC)
	OFF1	0	NOT Ready to operation (Inoperable condition by PLC)
1	No OFF2	1	Maintain the current operating condition.
	OFF2 (Free Run Stop)	0	Coast stop: Stop the motor by Free Run Stop.
2	No OFF3	1	Maintain the current operating condition.
	OFF3	0	Stops driving the motor using the method set in quick stop among the parameters of the inverter.
3	Enable Operation	1	Drives the motor using setpoint value received from the PLC via Profibus DP communication.
	Disable Operation	0	Stops driving the motor in the manner set in ADV-8 stop mode among the parameters of the inverter.
4	Enable Ramp Generator	1	Refer to Acc Time and Dec Time of drive group (PAR->DRV) among the parameters of the inverter, accelerate/decelerate a certain amount of time to reach the motor command value (Setpoint value).
	Reset Ramp Generator	0	Force the motor command value to 0 (the frequency decelerates to 0 Hz as set by Dec Time).
5	Unfreeze Ramp Generator	1	Without fixing the ramp generator operation, refer to Acc Time and Dec Time of drive group (PAR->DRV) among the parameters of the inverter, accelerate/decelerate a certain amount of time to reach the motor command value (Setpoint value).
	Freeze Ramp Generator	0	Through the Profibus DP, ignore the motor commands from the PLC entered, fix the ramp generator movement and operate the motor at the rotational frequency of the current motor.
6	Enable Setpoint	1	Operates the motor according to the motor command value of the PLC.
	Disable Setpoint	0	Forces the motor command value to zero.
7	Fault Acknowledge	(0 -> 1)	When changing from 0 to 1, turn off the inverter's fault.
8	Jog1 ON/OFF	-	Not supported
9	Jog2 ON/OFF	-	Not supported
10	Control By PLC	1	Controls the inverter using control word (STW1) received from the PLC via Profibus DP communication.

Bit	Name	Value	Description
	No Control By PLC	0	Ignores the control word (STW1) received from the PLC via Profibus DP communication.
11 ~ 15	-	-	Reserved

### 5.1.2 Status word(ZSW1)

Bit	Name	Value	Description
0	RDY_ON	1	Ready To Switch ON (Operational status)
		0	Not Ready To Switch OFF (Inoperable state)
1	RDY_OPERATION	1	Indicates the bit 0 value of the currently entered control word (STW1).
		0	
2	OPERATION	1	Indicates the bit 3 value of the currently entered control word (STW1).
		0	
3	Fault Present	1	Indicates that a fault exists in the inverter.
	No Fault	0	Indicates that no fault exist in the inverter.
4	No OFF2	1	Indicates the bit 1 value of the currently entered control word (STW1).
	OFF2	0	
5	No OFF3	1	Indicates the bit 2 value of the currently entered control word (STW1).
	OFF3	0	
6	SWC_ON_INHIB	1	Switching On inhibited (Out of control)
		0	Switching On Not inhibited (Controllable status)
7	Warning Present	1	Indicates that a warning exists in the inverter.
	No Warning Present	0	Indicates that a warning does not exist in the inverter.
8	Speed Error within tolerance	1	Indicates that the actual rotational frequency of the motor has been reached at the command frequency (Setpoint value).
	Speed Error out of tolerance	0	Indicates that the actual rotational frequency of the motor has not been reached at the command frequency (Setpoint value).
9	Control Requested	1	Indicates the bit 10 value of the currently entered control word (STW1).
	No Control Requested	0	
10	ABOVE_LIMIT	-	Not Supported
11 to 15	-	-	Reserved

### 5.1.3 Setpoint value

4.2.14 Defined by the value set in 14 Profibus DP PROFIdrive value. This is essentially the area for determining the speed of the operation command.

If COM-14 is set to PROFIdrive standard (0), within 0xC000 (-100%) to 0x4000 (100%), the target is set as a percentage of the target frequency relative to the reference point. The corresponding reference point is the DRV-20 Max Freq value.

If COM-14 is set to vendor specification (1), the unit is RPM and scale is 1. The Decimal value is applied and negative indicates a reverse command.

Ex) If COM-14 is set to PROFIdrive standard (0) and DR-20 Max Freq is set to 60 Hz, the inverter outputs 60 Hz when the setpoint value is 0xC000.

If COM-14 is set to PROFIdrive standard (0) and DR-20 Max Freq is set to 400 Hz, the inverter outputs 400 Hz when the setpoint value is 0xC000.

When COM-14 is set to vendor specification (1), and the setpoint value is 0x04B0, the inverter outputs 1,200 RPM.

### 5.1.4 Actual speed value

4.2.14 Defined by the value set in 14 Profibus DP PROFIdrive value. This is essentially the area for determining the actual output rate.

If COM-14 is set to PROFIdrive standard (0), it outputs a percentage of the actual frequency relative to the reference point within 0xC000 (-100%) to 0x4000 (100%). The corresponding reference point is the DRV-20 Max Freq value.

If COM-14 is set to vendor specification (1), the unit is RPM and scale is 1. This applies the decimal value and if the value is negative, it means a reverse operation.

## 5.2 I/O Profile

Proceeds with the data exchange without applying a separate profile. PZD 1-8 is set according to the parameter address value specified only in Para Control-1-8 and Para Status-1-8, and the number of words to and from the master during I/O configuration shall match the 4.2.4 Para Status Num and 4.2.6 Para Ctrl Num settings. Applies only when using the vendor specific telegram (100). \* See Figure 4 I/O profile.

## 5.3 LS Drive Profile

Standardization profile as defined by LS ELECTRIC. This is a profile used in drive speed control mode, and control/status can be checked from moment to moment according to control word and status word. When using this LS Drive profile, it is not recommended to access control parameters (0h0005 and 0h000A), such as the operation of the inverter and the target frequency. See Figure 6 for information on state machines.

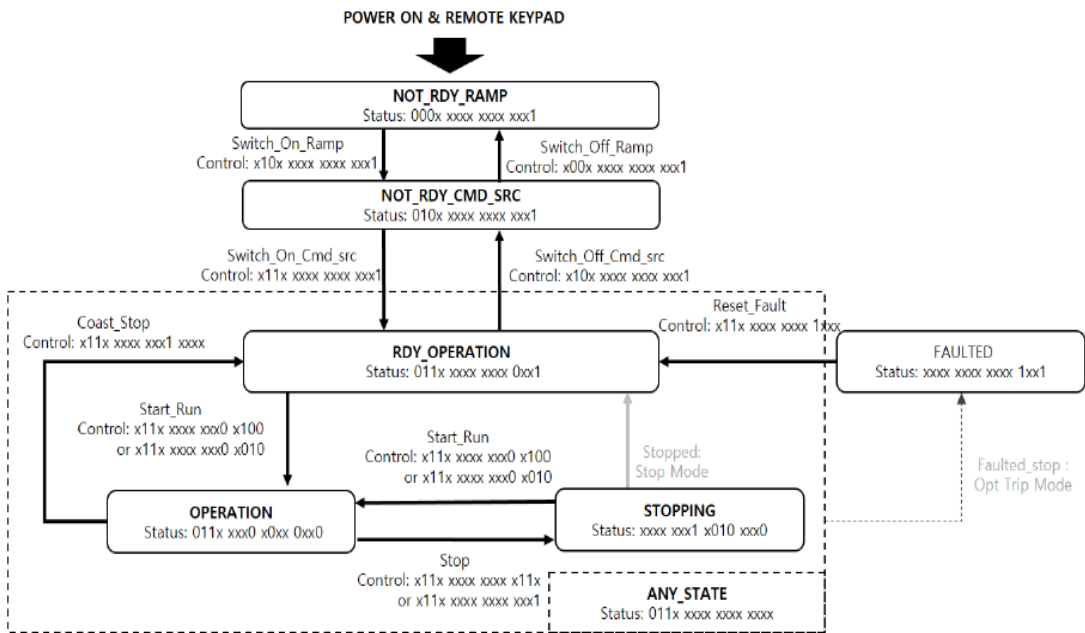


Figure 6. LS Drive Profile state machine

### 5.3.1 Control word

Bit	Name	Value	Description
0	Stop	0	No control commands
		1	Operation stop command
1	Move forward	0	No control commands
		1	Move forward command
2	Move backward	0	No control commands
		1	Move backward command
3	Defect released	0	No control commands
		1	Initialize fault status
4	Emergency stop	0	No control commands
		1	Forced emergency stop (Coast Stop)
5 ~12	-	-	-
13	Operation command authority	0	Cancel remote driving command authority
		1	Grant remote driving command authority
14	RAMP source command authority	0	Cancel remote RAMP source command authority
		1	Grant remote RAMP source command authority
15	-	-	-

### 5.3.2 Status Word

Bit	Name	Value	Description
0	Stop	0	Not stopped
		1	Stop by the stop mode
1	Moving forward	0	Not moving forward
		1	Moving forward
2	Moving backward	0	Not moving backward
		1	Moving backward
3	Defect occurred	0	No defects
		1	Defect occurred
4	Accelerating	0	Not accelerating
		1	Accelerate according to the target command

Bit	Name	Value	Description
5	Decelerating	0	Not decelerating
		1	Deceleration according to the target command
6	Speed reached	0	Target speed not reached
		1	Target speed reached
7	DC braking	0	No DC braking
		1	DC braking
8	Stopping	0	No stop mode
		1	Entering stop mode
9	Jog mode	0	Jog mode OFF
		1	Jog mode ON
10	Brake open signal	0	No open signal
		1	Open signal generated
11	Move forward command	0	No control commands
		1	Received move forward command
12	Move reverse command	0	No control commands
		1	Backward operating command received
13	Preparing operation command	0	Remote driving command authority canceled
		1	Remote driving command authority granted
14	Preparing RAMP source command	0	Remote RAMP source command authority canceled
		1	Remote RAMP source command authority granted
15	Keypad control status	0	Remote control in progress
		1	Locally controlling keypad

### 5.3.3 Setpoint value

Indicates the operating command frequency. The unit is Hz and the scale is 0.01.

### 5.3.4 Actual speed value

Indicates the actual operating frequency of the inverter in decimal value. The unit is Hz and the scale is 0.01.

# 6 Communication Protocol

## 6.1 Cyclical message types

For the Profibus DP communication module and master to proceed with data exchange, set how many words of data you want to send and receive. Telegram settings are basically set by the master during I/O configuration and cannot be set by the communication module itself.

### 6.1.1 PPO Type

This is a telegram type that simultaneously supports reading and writing of the parameter data part. Each type number specifies a telegram in a uniquely specified word unit (2 bytes). The area for PZD 1 and PZD 2 cannot be used arbitrarily because PROFIdrive profile is used when using PPO type telegram. Process data can be arbitrarily set from PZD 2 to PZD 10.

PPO Type	Parameter data area							Process data																				
	PKW							PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD6	PZD7	PZD6											
OUT area	Identifier	Index	Value				STW1 (fixed)	REF (fixed)	Para Control-1	Para Control-2	Para Control-3	Para Control-4	Para Control-5	Para Control-6	Para Control-7	Para Control-8												
IN area							ZSW1 (fixed)	ACT (fixed)	Para Stauts-1	Para Stauts-2	Para Stauts-3	Para Stauts-4	Para Stauts-5	Para Stauts-6	Para Stauts-7	Para Stauts-8												
Byte [HI   LO]	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
PPO1																												
PPO2																												
PPO3																												
PPO4																												
PPO5																												
PPO6																												

Figure 7. Structure Comparison of PPO Types

OUT area: Data (control data) sent from the master to slave.

IN area: Data sent from slave to master (actual data).

### Parameter data area

- ID : Parameter identification(type and number)
- IND : subIndex of parameter
- Value : Request/Response Parameter value
- PKW : Parameter ID/value

### Process data

- STW1 : Control word
- ZSW1 : Status word
- REF : Reference Value
- ACT : Actual Value
- PZD : User-specific area Process data

## 6.1.2 Standard Telegram1

Standard Telegram 1 consists of control word (two words sent to the drive), status word, and actual speed, which are the two words returned to the setpoint value and PLC.

	Byte 0-1 (PZD1)	Byte 2-3 (PZD2)
PLC to Drive	Control word(STW1)	Setpoint value (REF)
Drive to PLC	Status word(ZSW1)	Actual speed value(ACT)

### 6.1.3 Vender Specific Telegram

Instead of using a separate standardized telegram, depending on the Para Control Num and the Para Status Num, the number of words to use is determined. PZD 1-8 is set according to the parameter address value specified in Para Control-1-8, Para Status-1-8.

	Byte 0-1 (PZD1)	Byte 2-3 (PZD2)	Byte 4-5 (PZD3)	Byte 6-7 (PZD4)	Byte 8-9 (PZD5)	Byte10-11 (PZD6)	Byte12-13 (PZD7)	Byte14-15 (PZD8)
PLC to Drive	Para Control-1	Para Control-2	Para Control-3	Para Control-4	Para Control-5	Para Control-6	Para Control-7	Para Control-8
Drive to PLC	Para Status-1	Para Status-2	Para Status-3	Para Status-4	Para Status-5	Para Status-6	Para Status-7	Para Status-8

## 6.2 Parameter Access

### 6.2.1 Cyclic Parameter data transfer (DP-V0)

The parameter access of the method is used only when using PPO type 1, 2, and 5 telegrams. The parameter data area (PKW) portion defines a separate header for parameter access. The PKW telegram section can be used to monitor and/or change the parameters of the inverter. Inside PKW, it is divided into PKE, IND, and PWE, and the structure is 8 bytes as shown below.

Parameter data area								Process data			
Identifier		Index		Value				SWT1	REF	...	...
								ZSW1	ACT	...	...
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	...	...	...	...

bit15	bit14	bit13	bit12
Request label			
Response label			

The request label is used by the master when sending data to the slave, and the response label is used when the slave checks for positive or negative responses. See the table below for details.

Request labels (from master to slave)		Response label (Acknowledgement from slave to master)	
Request identifier	Function	Response identifier	
		Positive	Negative
0	No task	0	-
1	Request parameter value	1,2	7
2	Change parameter value (word)	1	7,8
3	Change parameter value (double) *not supported	2	7,8
4	Request description element *not supported	3	7
5	Change description element *not supported	3	7,8
6	Request parameter value (array)	4,	7,8
7	Change parameter value (array word)	4	7,8
8	Change parameter value (array double word) *not supported	5	7,8
9	Request number of array elements *not supported	6	7

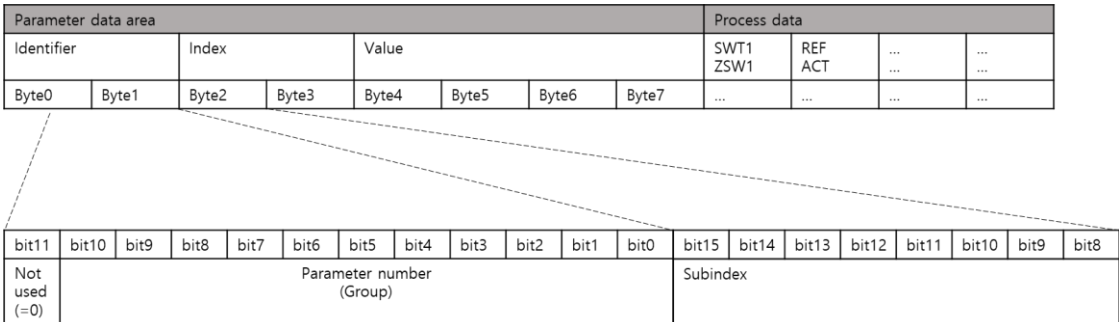
Response label (Acknowledgement from slave to master)	
Response identifier	Function
0	No response
1	Transfer parameter value (word)
2	Transfer parameter value (double word) *not supported
3	Transfer description element *not supported
4	Transfer parameter value (array word)
5	Transfer parameter value (array double word) *not supported
6	Transfer number of array elements *not supported

Response label (Acknowledgement from slave to master)	
7	Task cannot be executed, followed by error number
8	No parameter change rights for PKW interface
9	Parameter data signal (word) *not supported
10	Parameter data signal (double word) *not supported

This means that the command cannot be executed if the response identifier value is 7 and returns an error code to the value (parameter value) of the response packet. The details are as follows.

Error code	meaning
h00	Illegal parameter number
h01	Parameter value cannot be modified
h02	Low or high limit exceeded
h03	Invalid subindex
h04	No array
h05	Incorrect data type
h06	Setting not permitted (can only be reset)
h07	Description element cannot be changed
h09	No description data available
h0B	No operation priority
h0F	No text array available
h11	Request cannot be executed because of operating mode
h14	Value impermissible
h15	Response too long
h16	Parameter address impermissible
h17	Illegal format
h18	Number of values inconsistent

To assign the PROFIdrive and Drive parameters to the parameter identification part within the PPO Type:



- The group column corresponds to the parameter number (PNU) of the identifier.
- The Subindex column corresponds to the IND portion of the parameter index.

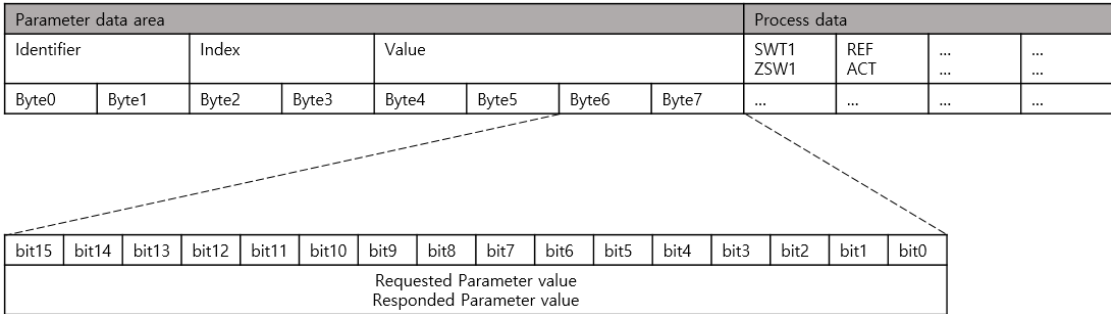
PROFIdrive Parameters			
Parameter number(decimal)	Group	Subindex	
918	0	0h396	0h00
922	0	0h39A	0h00
...	...	...	...
964[0]	0	0h3C4	0h00
964[1]	1		0h01
...	...	...	...

See Chapter 7 PROFIdrive Parameters for a full list of PROFIdrive parameters.

Drive Parameters		
Parameter number(heximal)	Group	Subindex
0h000A	0h000	0h0A
0h000B	0h000	0h0B
0h0316	0h003	0h16
...	...	...
0h1101	0h011	0h01
...	...	...

For a full list of drive parameters, see parameter sessions in the drive user manual.

The parameter value can be set according to the read/write properties of each specified parameter, and the value of the requested parameter number can be read or changed. Only the data of Byte 6 and 7 is valid because they do not support 32-bit data, just 16-bit data.



Note: To prevent continuous writing of parameters, the requested parameter value is applied only once when the request value changes.

### 6.2.2 Acyclic Parameter data transfer (DP-V1)

It is a method of periodically requesting/responding parameters by accessing from master class 2 without being dependent on a separate telegram type. The method to use the write/read service for the drive parameters is as follows:

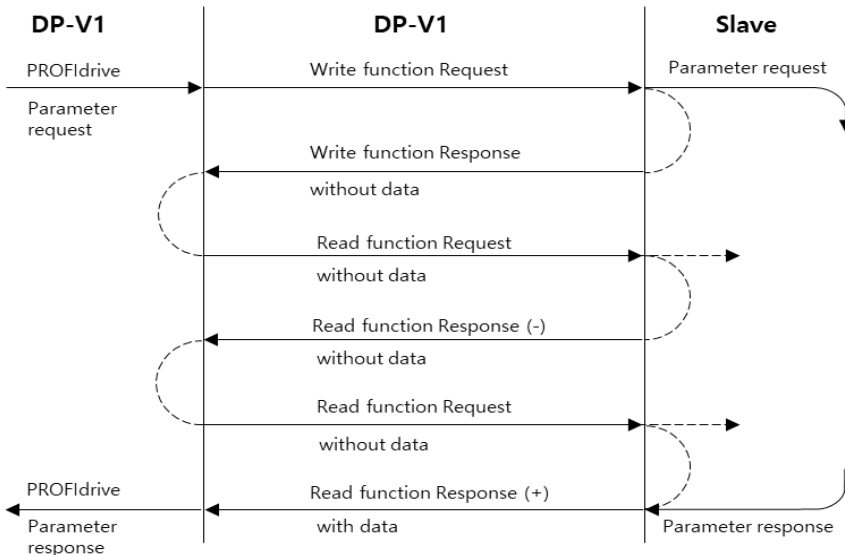


Figure 8. PROFIdrive Acyclic Parameter Access Mechanism

If the write request is a valid request, the communication module accepts it. The master can then send read requests. If the communication module is still performing an internal parameter request, it returns a response with the error code 0xB5 (State conflict).

PROFIBUS DP-V1 frames are mapped inside standard PROFIBUS frames as follows:

PROFIBUS frame					
PROFIBUS header	DU(Data Unit)				PROFIBUS Trailer
(SD ... SSAP)	DP-V1 header	Parameter Request header (write request or read request)	Parameter address	Parameter value	(FCS, ED)
		Parameter Response header	Parameter value		

**DP-V1 header**

DP-V1 header consists of 4 bytes, each 1 byte content is as follows:

DU	Byte	Field(s)	Description	Allowed values
DP-V1 header	0	Function Number	PROFIBUS DP Function code	0h48 = Idle requests, response 0h57 = Initiate requests, response 0h58 = Abort requests 0h5E = read requests, response 0h5F = write requests, response
	1	Slot Number	PROFIBUS DP Device Slot No.	0h01 = parameter access
	2	Index	PROFIBUS DP index for specific properties	47(decimal) = Parameter Access
	3	Data Length	Number of data bytes in the parameter request frame. This unit of number is byte excluding DP-V1 header.	(It depends on the type of message the master requests.)

**Error responses of DP-V1 function**

DU	Byte	Field	Description	Allowed values
DP-V1 header	0	Function Number	PROFIBUS DP function code	0hDE = slave response error in read request. 0hDF = slave response error in write request.
	1	Error Decode	Displays the information values for the error decoding method.	128
	2	Error Code 1	The top 4 bits represents the error class, and the bottom 4 bits represents the error code.	See the Error code 1 table below
	3	Error Code 2	Application-specific	0

**Error code 1 :**

Error class	Meaning	Error code
0...9	(Reserved)	
10 (0h0A)	Application	0 = Read error 1 = Write error 2 = Module failure 3...7 = Reserved 8 = Version conflict 9 = Feature not supported 10...15 = User-specific
11 (0h0B)	Access	0 = Invalid index 1 = Write length error 2 = Invalid slot 3 = Type conflict 4 = Invalid area 5 = State conflict 6 = Access denied 7 = Invalid range 8 = Invalid parameter 9 = Invalid type 10...15 = User-specific
12 (0h0C)	Resource	0 = Read constraint conflict 1 = Write constraint conflict 2 = Resource busy 3 = Resource unavailable 4...7 = Reserved 8...15 = User-specific
13...15	User-specific	-

**Parameter Requests**

Each parameter request via PROFIBUS DP-V1 consists of three elements:

Request header	Parameter address	Parameter value (only in Change requests)
----------------	-------------------	--

Parameter Request				
DU	Byte	Field(s)	Description	Allowed values
Request header	0	Request Reference	Unique identification ID entered by the master. Request by changing it according to each new request.	1-255
	1	Request ID	Request type of issued block.	Request Parameter (0h01) Change Parameter (0h02)
	2	Drive Object ID	Always 0x01	0-1
	3	No. of Parameters	Number of parameters n to request	1-8
Parameter address 1)	4+n-1	Attribute	Value properties for parameters to be accessed.	Value (0h10)
	5+n-1	No. of Elements	Length of array element parameter or string to be accessed. Set to 0 if you are using a non-array parameters.	0-8
	6+n-1, 7+n-1	Parameter Index	Parameter address to access.	-
	8+n-1, 9+n-1	Subindex	Sub-address of parameter address	-
Parameter value 2)	10	Format	Data type	Unsigned16(0h06)
	11	Number of Values	Number of arrays to be changed in the parameter with Change Parameter (0h02). Only array type parameters are applied.	0-8
	12, 13	Values	Requested Value	-

- 1) If you request multiple Request ID 01h (parameter request), it is repeated with n.
- 2) The format, number of values, and values fields are repeated for other parameters only if the request ID is 02h (parameter change).

### Parameter Responses

Each parameter response to PROFIBUS DP-V1 consists of two elements:

Response header	Parameter value (only in requests parameter)
-----------------	---

Parameter Response				
DU	Byte	Field(s)	Description	Allowed values
Response header	0	Response Reference (mirrored)	Returns requested unique identification ID	1-255
	1	Response ID	Type of response returned by the slave. If the requested service fails, a Not Approved (NAK) response is displayed.	Request Param OK(0h01) Request Param NAK(0h81) Change Param OK(0h02) Change Param NAK(0h82)
	2	Drive Object ID	Always 0x01	0-1
	3	No. of Parameters	Number of response parameters requested n	1-8
Parameter value 3)	4+n-1	Format	Data type	Unsigned16(0h06)
	5+n-1	Number of Values	Number of array requested response values per parameter	Depending on requested Parameter numbers
	6+n-1, 7+n-1	Values	Response value of the requested address	-

3) The format, number of values, and values fields are repeated for other parameters only if the response ID is 01h (request parameter OK). Receives the requested n.

## 7 PROFIdrive Parameters

### 7.1 Supported Parameters

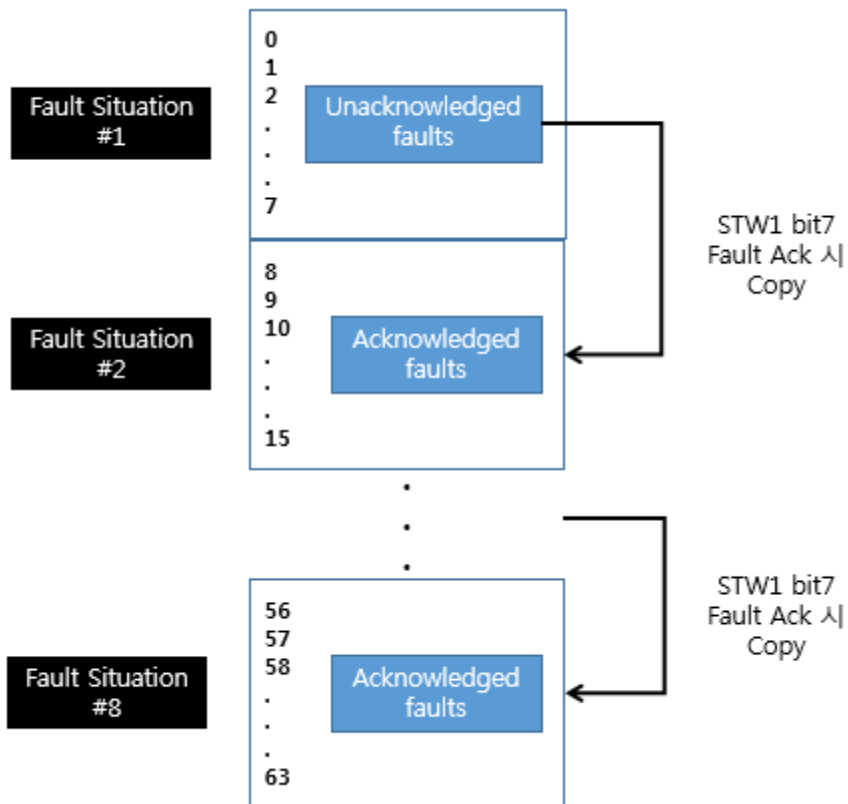
Parameters			
PNU	R/W	Data Type	Description
918	R	Unsigned16	Displays the selected node address in the FBus ID (COM-07).
922	R	Unsigned16	Displays the selected cyclic telegram in the master's I/O configuration. 1 : Standard Telegram 1 100 : Vender Specific Telegram 101 : PPO Type 1 (PKW 4/4 + PZD 2/2) 102 : PPO Type 2 (PKW 4/4 + PZD 6/6) 103 : PPO Type 3 (PZD 2/2) 104 : PPO Type 4 (PZD 6/6) 105 : PPO Type 5 (PKW 4/4 + PZD 10/10) 106 : PPO Type 6 (PZD 10/10) * Vendor specific telegram means using the set Process data according to the Para Status Num (COM-30) and Para Ctrl Num (COM-50) of the inverter.
930	R	Unsigned16	Indicates the communication profile currently in use. 1 : PROFIdrive Profile 0x8000 : I/O Profile 0x8002 : LS Drive Profile * When using vendor specific telegram, 0x8000 is applied. Therefore, control word (STW1) and status word (ZSW1) cannot be used/verified.
944	R	Unsigned16	The fault message counter value, which increases by one each time a fault occurs. Depending on whether this parameter value is increased, the Profibus DP Controller, such as PLC, can determine whether a new fault has occurred in the inverter.
947	R	Array[8][8] Unsigned16	Fault number * See description of PNU[944] Fault Message Counter and PNU[947] Fault Number.
953	R	Unsigned16	Warning word * Displays the value of the Warning Information parameter at inverter communication address 0h0334.

Parameters			
963	R	Unsigned16	<p>Detected baud rate:</p> <p>0 = 9.6 kbit/s            1 = 19.2 kbit/s            2 = 93.75 kbit/s            3 = 187.5 kbit/s            4 = 500 kbit/s            6 = 1.5 Mbit/s            7 = 3 Mbit/s            8 = 6 Mbit/s            9 = 12 Mbit/s            11 = 45.45 kbit/s            255 = Invalid baud rate</p>
964	R	Array[7] Unsigned16	<p>A value for a five-word (16-bit) array that displays information about the communication module.</p> <p>0: Displays 849 (0h0351) as the manufacturer ID of LS ELECTRIC as defined in manufacturer (Profibus.org).</p> <p>1: Device type: The Profibus DP communication module displays a value of 1.</p> <p>2: Version: Indicates the software version.            Ex) Version 1.2 is displayed as 0h0102.</p> <p>3: Firmware date (yyyy): Indicates the year the software was created.            Ex) 2021 is displayed as 0h07E5.</p> <p>4: Firmware Data (dd/mm): Indicates the date/month when the software was created.            Ex) December 25 is displayed as 0h0C19.</p> <p>5: Number of Axes</p> <p>6: Identification (0h0A6C)</p>
965	R	Unsigned16	<p>Parameter that displays the profile ID.            (0h0328 – Profile 3 v4.0)</p>
967	R	Unsigned16	<p>Displays the control word (STW1) value that is currently input through the Profibus DP.</p>
968	R	Unsigned16	<p>Displays the current status word (ZSW1) value passed through the Profibus DP.</p>
972	R/W	Unsigned16	<p>When the value is changed from 0 to 1, the Profibus DP communication module is reset to initialize the values of 944, 947, and 953 to zero.</p>

## 7.2 Description of PNU[944] Fault Message Counter and PNU[947] Fault Number.

Each time the inverter encounters a fault, the PNU[944] Fault Message Counter value increases by 1, which is stored in the PNU[947] Fault Number variable.

The PNU[947] Fault Number can store eight fault situations, and each fault situation can store eight fault messages. Since each fault message is a 16-bit word, the PNU[947] Fault Number consists of 64 words in total. The basic configuration is shown below.



Fault situation #1 stores the currently occurring fault messages. Each fault message is stored sequentially from the first time (index: 0) in the order of occurrence, and if there are more than eight, it is overwritten to the 8th (index: 7) memory. If bit 7 of control word (STW1) of PLC is set to 1 to cause Fault Ack, the value of fault situation #1 is moved to fault situation #2. This behavior is repeated until fault situation #7.

The stored fault message corresponds to the inverter trip information (latch type trip information-1/2, level type trip information, and hardware diagnostic trip information) one-to-one and is defined as follows:

Trip Name	Fault Message
Overload Trip	1
Underload Trip	2
Inverter Overload Trip	3
E-Thermal Trip	4
Ground Fault Trip	5
Out phase open trip	6
In phase open trip	7
Reserved	8
Reserved	9
NTC Trip	10
Overcurrent Trip	11
Overvoltage Trip	12
External Trip	13
Arm Short	14
Overheat Trip	15
Fuse Open Trip	16
Reserved	17
Reserved	18
PTC (Thermal sensor) trip	19
FAN Trip	20
Reserved	21
Error in Parameter Write	22
Pre PID Fail	23
Bad contact at basic I/O board	24
External brake trip	25
No Motor trip	26
Bad option card	27
Reserved	28
Safety A	29

## PROFIdrive Parameters

Trip Name	Fault Message
Safety B	30
Reserved	31
Reserved	32
BX	33
LV	34
Lost Command	35
Keypad Lost command	36
Reserved	37
Reserved	38
Reserved	39
Reserved	40
Reserved	41
Reserved	42
Reserved	43
Reserved	44
Reserved	45
Reserved	46
Reserved	47
Reserved	48
ADC error	49
EEPROM error	50
Watchdog-1 error	51
Watchdog-2 error	52
Reserved	53
QueueFull	54
Reserved	55
Reserved	56
Reserved	57
Reserved	58
Reserved	59
Reserved	60
Reserved	61
Reserved	62
Reserved	63
Can not connect	64

## 8 I&M records

The I&M function is one of the customer support services that is used to check basic information during the start-up and maintenance of the module.

	Content	Size	Description
DP-V1 header	Function_Num	1 Byte	5Fh
	Slot_Number	1 Byte	0...255(deciaml)
	Index	1 Byte	0hFF
	Length	1 Byte	0h04
Call Header	Extended_Function_Num	1 Byte	0h08
	reserved	1 Byte	0h00
	FI_Index	2 Byte	65000(deciaml) = I&M0

### Read/write access to I&M records

Content	Size	Description
Header	10 Byte	-
MANUFACTURER_ID	2 Byte	PROFINET Vendor ID 0h0351
ORDER_ID	20 Byte	Depending on Communication module order number
SERIAL_NUMBER	16 Byte	Serial number of Communication module
HARDWARE_REVISION	2 Byte	Hardware version of
SOFTWARE_REVISION	4 Byte	Format: V255.255.255 E.g., V1.0.0 = software version 1.00
REVISION_COUNTER	2 Byte	Revision number
PROFILE_ID	2 Byte	PROFIdrive (0x3A00)
PROFILE_SPECIFIC_TYPE	2 Byte	No profile specific type (0x0000)
IM_VERSION	2 Byte	Version is 1.1 (0x0101)
IM_SUPPORTED	2 Byte	I&M0 is supported (0x0001)

### Response structure for I&M0 (Read-only)

## 9 GSD file (Electronic Data Sheets)

A GSD file includes information about the PROFIBUS-DP communication module. The GSD file is required to utilize the PROFIBUS configuration software.

You can download the GSD file from the technical support page of LS ELECTRIC website (<http://www.ls-electric.com>).

\* Apply the GSD that matches the software version of the option module.

# Product Warranty

## 1. Warranty Period

The warranty period is 24 months from the date of manufacture.

## 2. Scope of Warranty

- 1) The initial diagnosis of faults should be conducted by the user.  
However, upon request, LS ELECTRIC or its representative(s) can undertake this task for a fee. If the cause of the fault is found to be the responsibility of LS ELECTRIC, this service will be free of charge.
- 2) This warranty only applies if the product is used under normal conditions according to the specifications and precautions described in the handling instructions, user manuals, catalogs, and caution labels.
- 3) During the warranty period, repairs shall be charged for the following cases:
  - (1) Replacement of consumable and life-limited parts (e.g. relays, fuses, electrolytic capacitors, batteries, fan, etc.).
  - (2) Failures or damage caused by improper storage, handling, negligence, or accidents by the user.
  - (3) Failures resulting from the user's hardware or software design.
  - (4) Failures caused by modifications made without LS ELECTRIC's consent.  
(If modifications or repairs are not conducted by LS ELECTRIC or its representative(s), further repairs including paid services will be refused.)
  - (5) Failures that could have been avoided if the user's equipment, in which the product is incorporated, had safety devices required by legal regulations or common industry standards.
  - (6) Failures that could have been prevented if maintenance and replacement of consumable parts were performed normally according to the handling instructions or user manuals.
  - (7) Failures and damage to the product caused due to the connected equipment or use of inappropriate consumables.
  - (8) Failures caused by external factors such as fire, abnormal voltage, force majeure, and natural disasters such as earthquakes, lightning, salt damage, wind, flood damage, etc.
  - (9) Failures that cannot be predicted/solved by current scientific technology at the time of manufacture.
  - (10) Other failures, damage, or defects recognized as the responsibility of the user.

# Manual Revision History

## Revision History

No	Date	Changes	Version No.
1	May 2012	First release	1.00
2	July 2015	Mass production of revised version	1.10
3	June 2022	Added new DPV1	1.20
4	Aug. 2023	COM 13 description added	1.30
5	Jun. 2024	Product Warranty Modified	1.40



### Eco-friendly business operation

At LS ELECTRIC, protecting the environment is the priority in operating our businesses.

We do our best to ensure a pleasant environment for all.



### Disposal of the product

The LSELECTRIC inverter products are designed to be eco-friendly. They can be separately collected and recycled for the iron, aluminum, copper, and plastic (cover parts) materials.