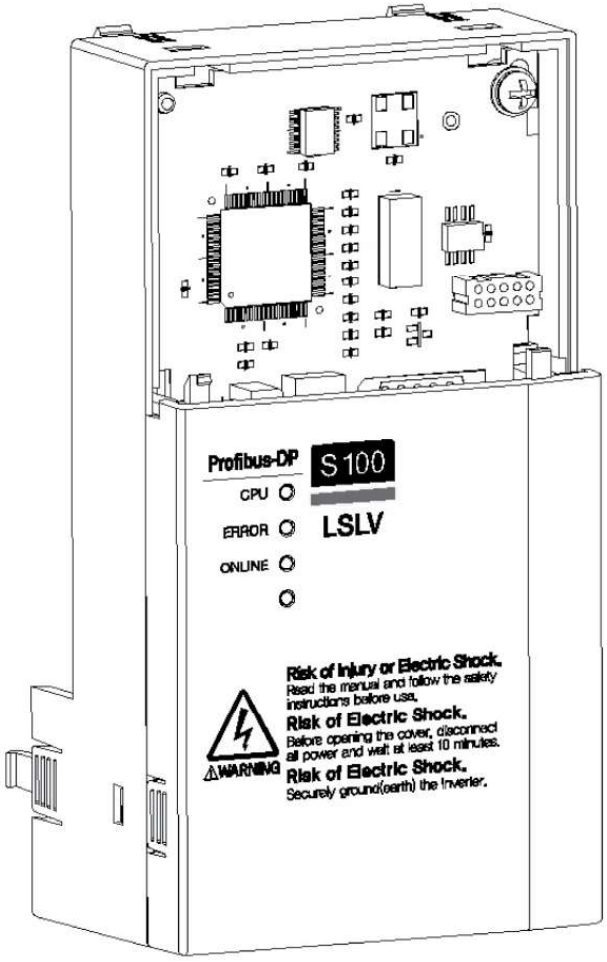
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# Profibus-DP Module

## 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-DPcommunication 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.

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# 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<br>(LS Define Profile) | I/O Profile(LS Define Profile),<br>PROFIdrive profile,<br>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 |
| | | 972 - Drive unit reset |
| 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 -> Download Center -> iS7 Profibus Option Manual

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

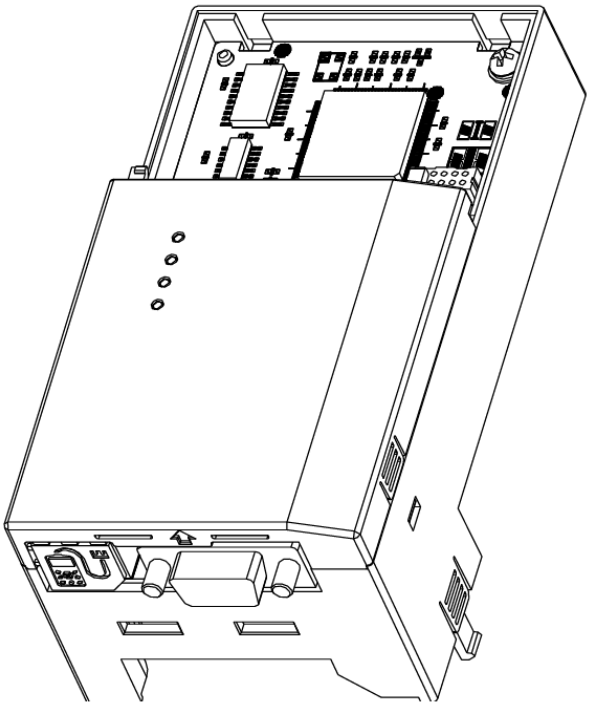


**Figure 1 PROFIBUS-DP Communication Module**

## 2.3 PROFIBUS- DP Communication Connector Specifications

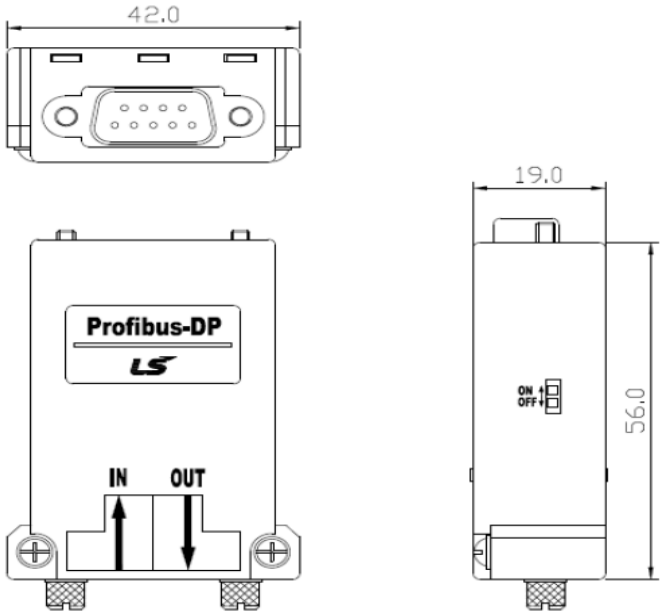
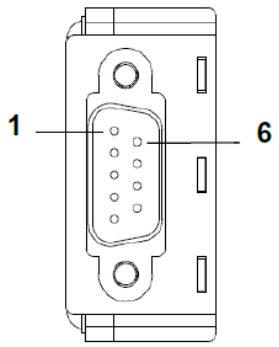



**Figure 2 PROFIBUS Connector**

| 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.

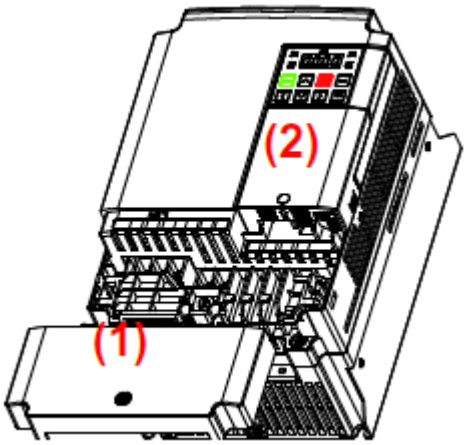
**Table 3 Definition of Signals**

## 2.4 Installation

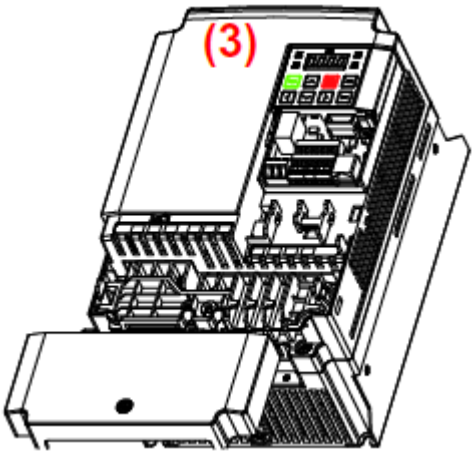
⚠ Warning

**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.

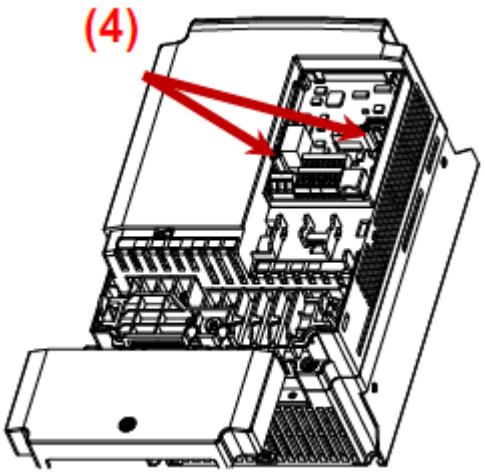
**1** After turning OFF the inverter power, remove the power cover (1) and then remove the I/O cover (2) to open the I/O cover.



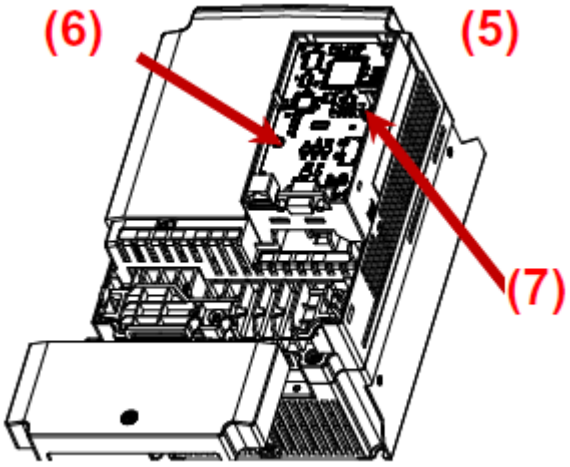

**2** Remove the keypad (3).



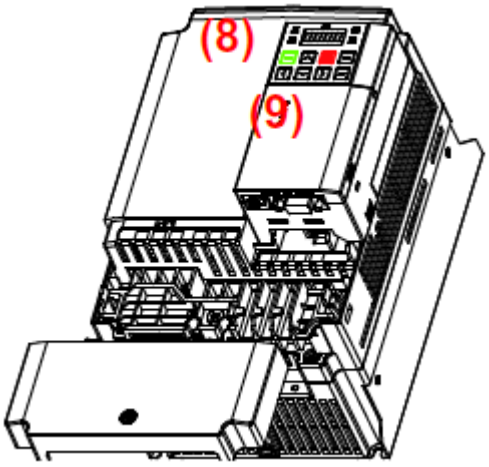
**3** Remove the screws (4) on the I/O board and fasten the enclosed brass bar (4).



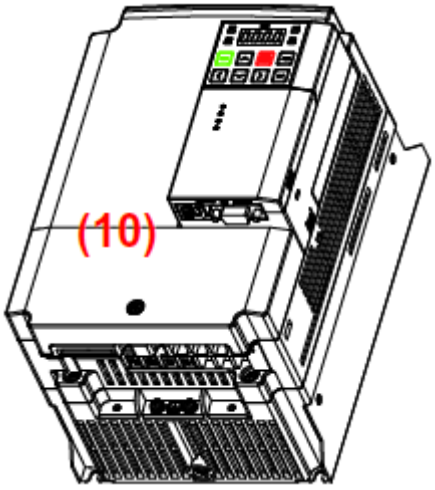

**4** Fasten the communication module (5) and fasten the screw (6) removed from the I/O board and the enclosed screw (7).



**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

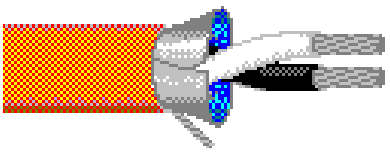
| Item | Description | |
|---|---|---|
| AWG | 22 |  |
| Cable Type | BC-Bare Copper | |
| Insulation | PE-Polyethylene | |
| Insulation Thickness | 0.035 inch | |
| Shield | Aluminum Foil-Polyester, Tape/Braid Shield | |
| Electrostatic Capacity | 8500pF/ft | |
| Characteristic Impedance | 150Ω | |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

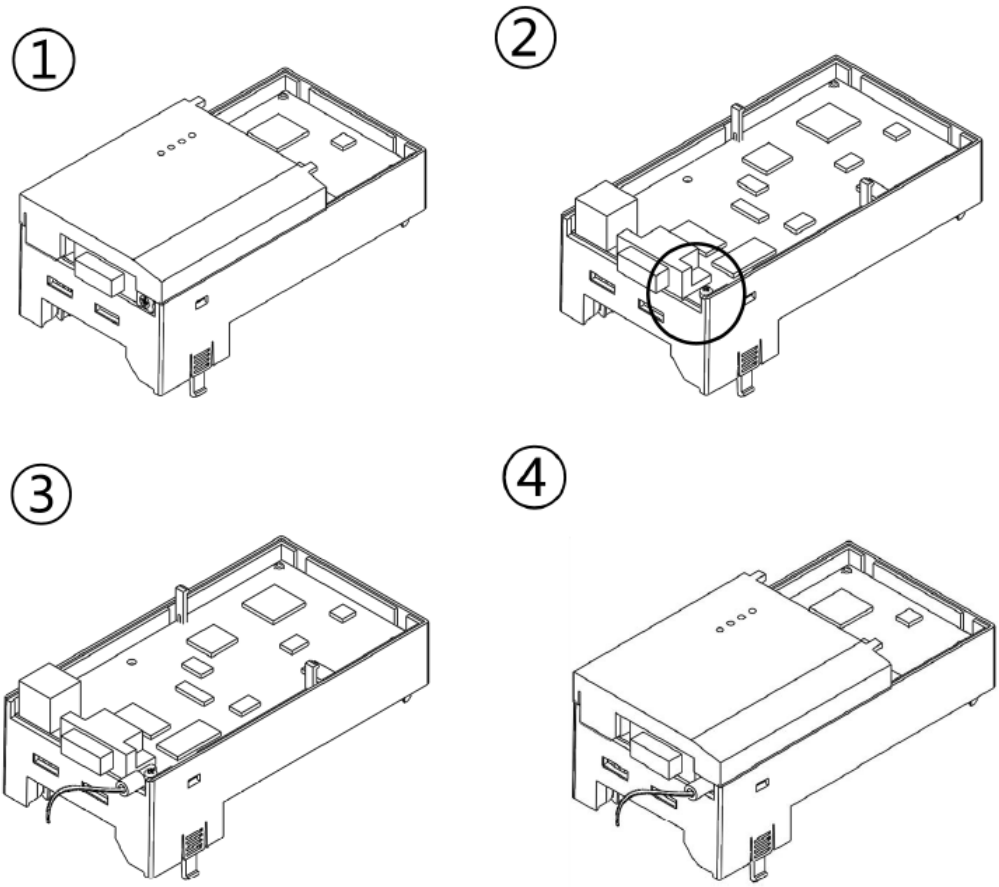
**Table 5 Maximum distance depending on communication rate**

*** 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.



**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 [mm2](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.

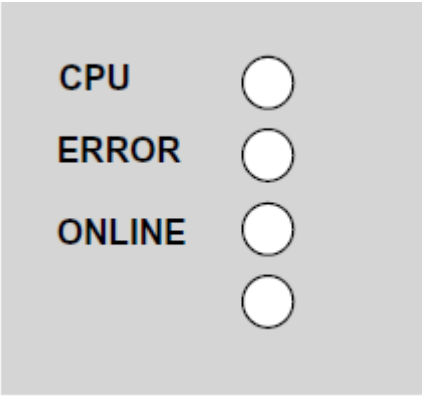



**Figure 3 LED Silk Printing**

| 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.<br>Check if the inverter has tripped.<br>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.<br>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<br>1:YES | Update keypad parameters related to network communication. |
| DR-20 | Max Freq | 60.00 | 40.00 ~<br>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.

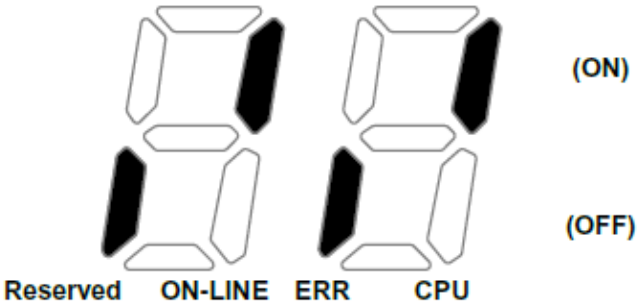
After changing the Station ID, you must set COM-94 (Comm Update) to 1 to apply the change to the PROFIBUS-DP communication module.

### 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<br>~<br>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<br>~<br>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 + (Group number * 0x100) + (Code number).

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 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 settings

| | |
|---|---|
| COM-50 | Number of Para Control settings |
| COM-51<br>~<br>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<br>~<br>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 + (Group number * 0x100) + (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 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

| 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<br>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%).<br><br>Ex) DRV-20(60.00hz)* 0x4000(100%) = Forward Target Frequency Value(60.00hz)<br><br>DRV-20(60.00hz)* 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 PROFBIUS 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.

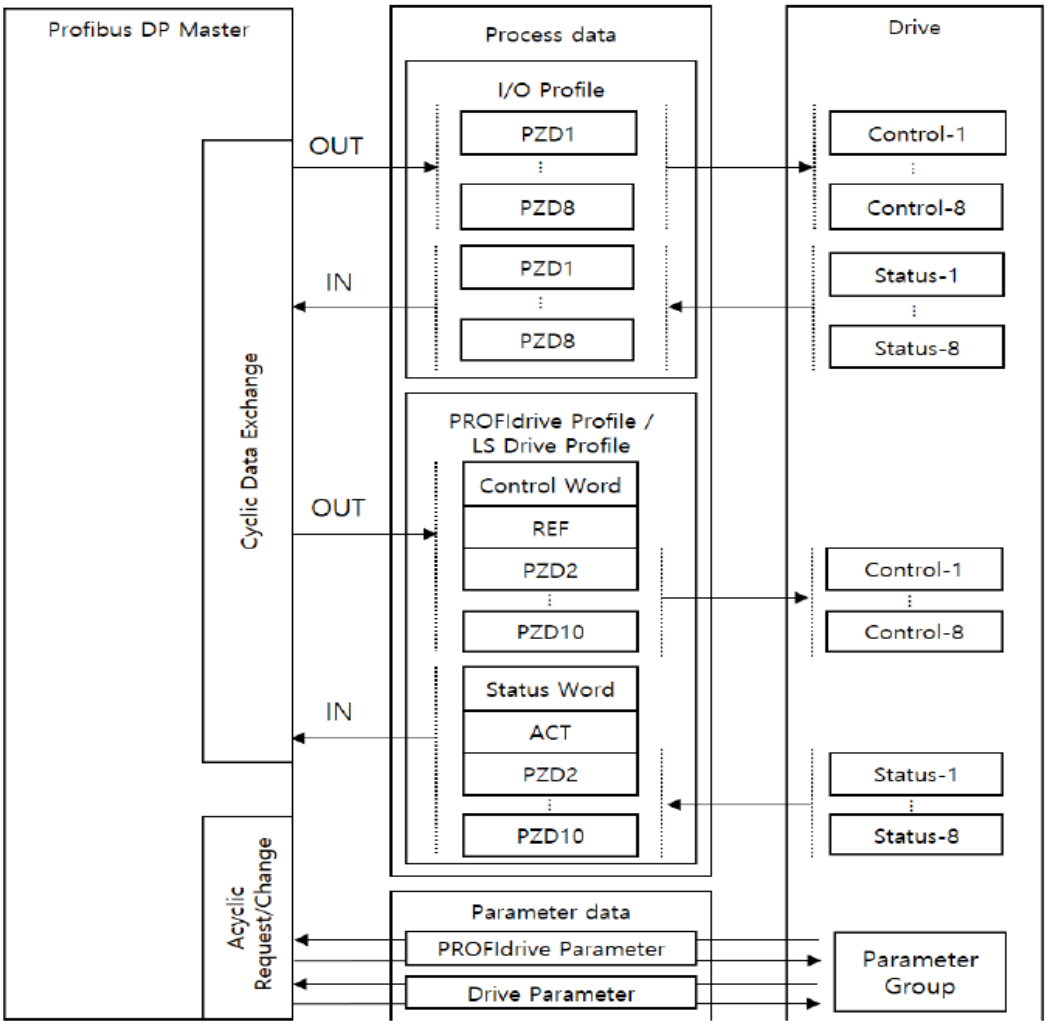



**Figure 4. Data Transfer between PROFIBUS DP Master and Drive**

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, PROFI drive 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 PROFI drive 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 PROFI drive profile. See Figure 5 for state machine information.

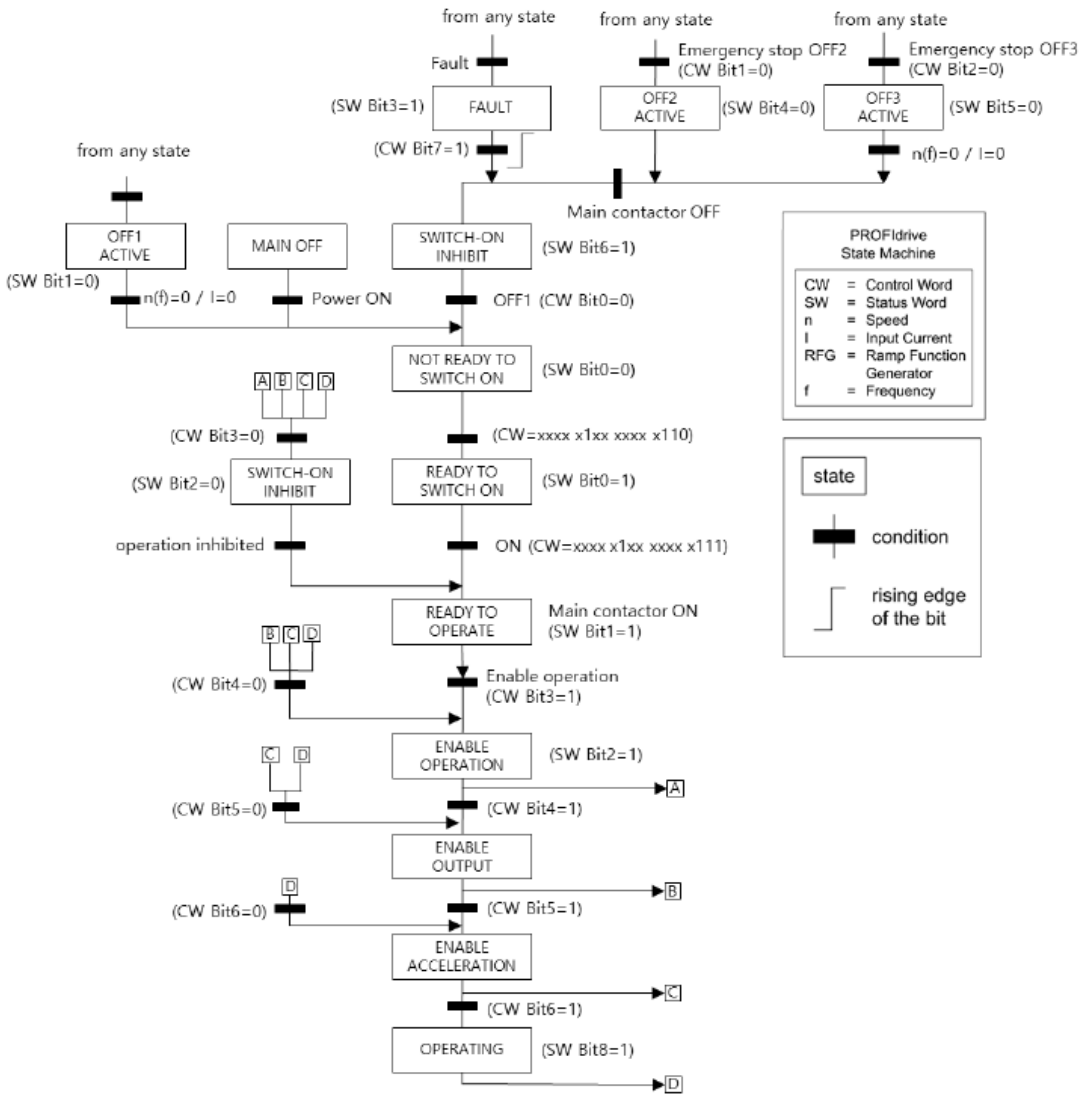



**Figure 5. PROFIdrive State machine**

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<br>(Operational status by PLC) |
| | OFF1 | 0 | NOT Ready to operation<br>(Inoperable condition by PLC) |
| 1 | No OFF2 | 1 | Maintain the current operating condition. |
| | OFF2<br>(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.

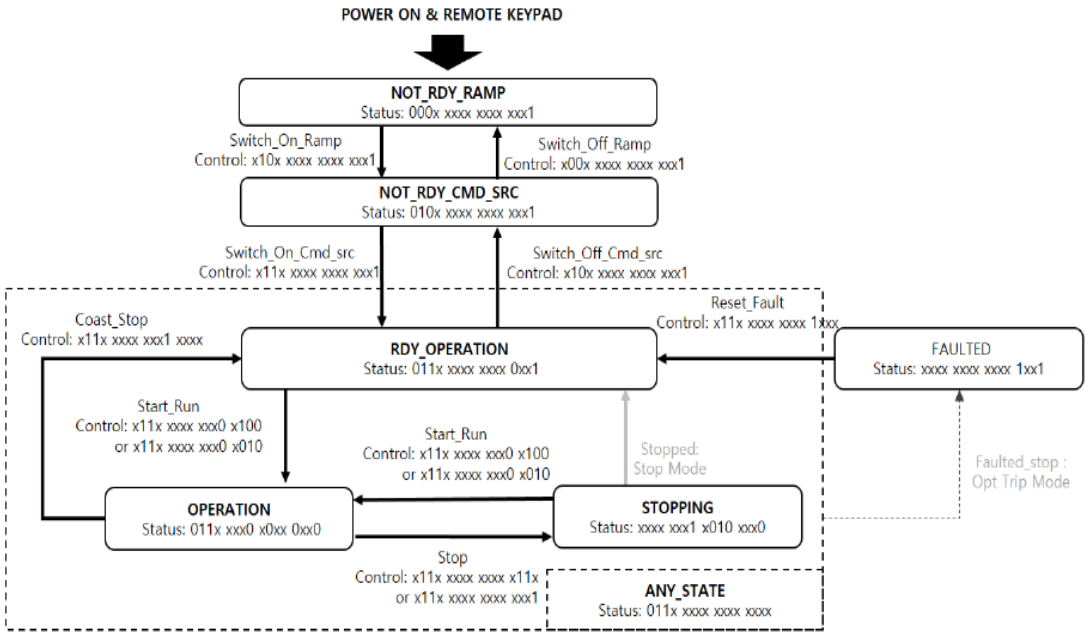



**Figure 6. LS Drive Profile state machine**

### 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 | | PZD8 | |
| 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

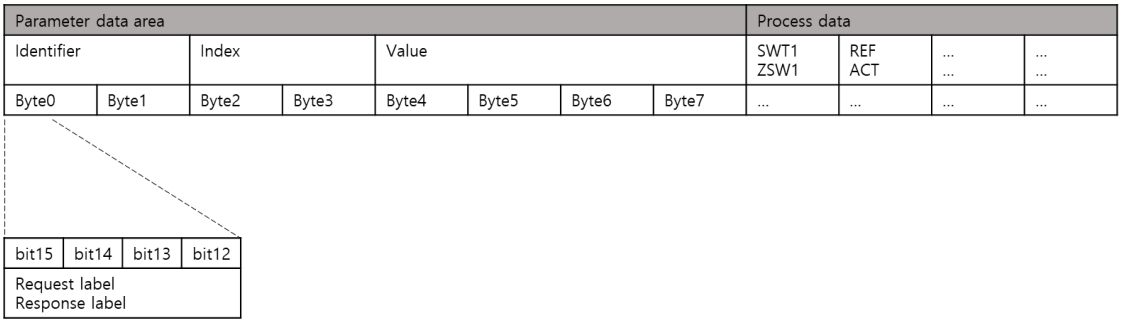
Instead of using a separate standardized telegram, depending on the Para Control Num and the Para Status Num, the number of words to use is determined. PZD 1-8 is set according to the parameter address value specified in Para Control-1-8, Para Status-1-8.

| | 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.



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)<br>*not supported | 2 | 7,8 |
| 4 | Request description element<br>*not supported | 3 | 7 |
| 5 | Change description element<br>*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)<br>*not supported | 5 | 7,8 |
| 9 | Request number of array elements<br>*not supported | 6 | 7 |

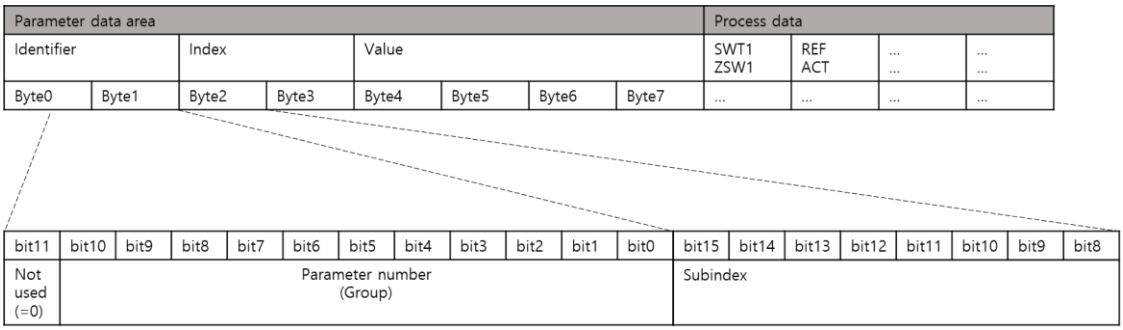
| Response label (Acknowledgement from slave to master) | |
|---|---|
| Response identifier | Function |
| 0 | No response |
| 1 | Transfer parameter value (word) |
| 2 | Transfer parameter value (double word)<br>*not supported |
| 3 | Transfer description element<br>*not supported |
| 4 | Transfer parameter value (array word) |
| 5 | Transfer parameter value (array double word)<br>*not supported |
| 6 | Transfer number of array elements<br>*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)<br>*not supported |
| 10 | Parameter data signal (double word)<br>*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.

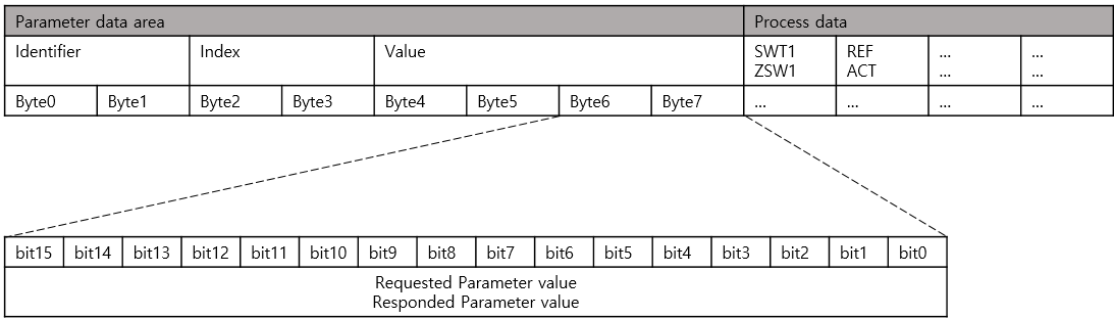
| PROFIdrive Parameters | | | |
|---|---|---|---|
| Parameter number(decimal) | | Group | Subindex |
| 918 | 0 | 0h396 | 0h00 |
| 922 | 0 | 0h39A | 0h00 |
| … | … | … | … |
| 964[0] | 0 | 0h3C4 | 0h00 |
| 964[1] | 1 | | 0h01 |
| … | … | … | … |

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:

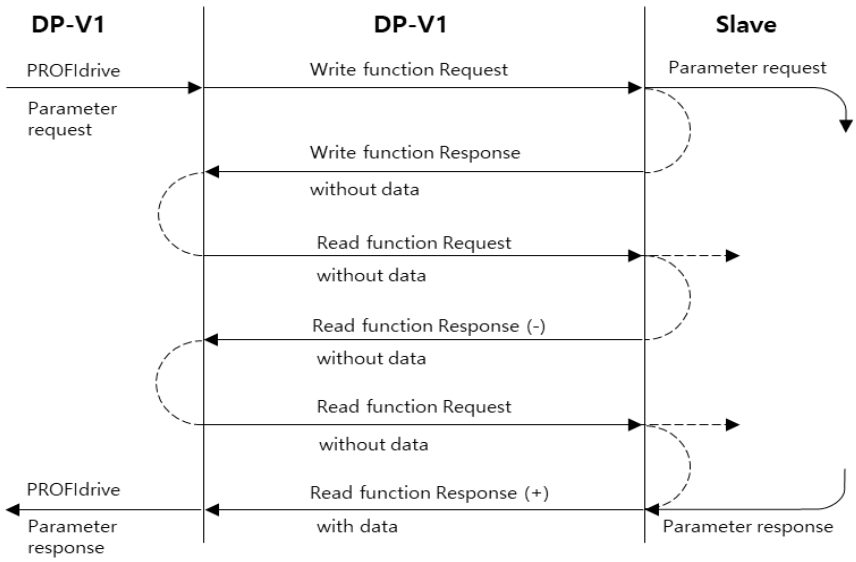



**Figure 8. PROFIdrive Acyclic Parameter Access Mechanism**

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:

<table>
<tr><th colspan="6">PROFIBUS frame</th></tr>
<tr><th>PROFIBUS header</th><th colspan="4">DU(Data Unit)</th><th>PROFIBUS Trailer</th></tr>
<tr><td rowspan="2">(SD … SSAP)</td><td rowspan="2">DP-V1 header</td><td>Parameter Request header (write request or read request)</td><td>Parameter address</td><td>Parameter value</td><td rowspan="2">(FCS, ED)</td></tr>
<tr><td>Parameter Response header</td><td colspan="2">Parameter value</td></tr>
</table>

**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<br>0h57 = Initiate requests, response<br>0h58 = Abort requests<br>0h5E = read requests, response<br>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.<br>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 |

**Errror code 1 :**

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

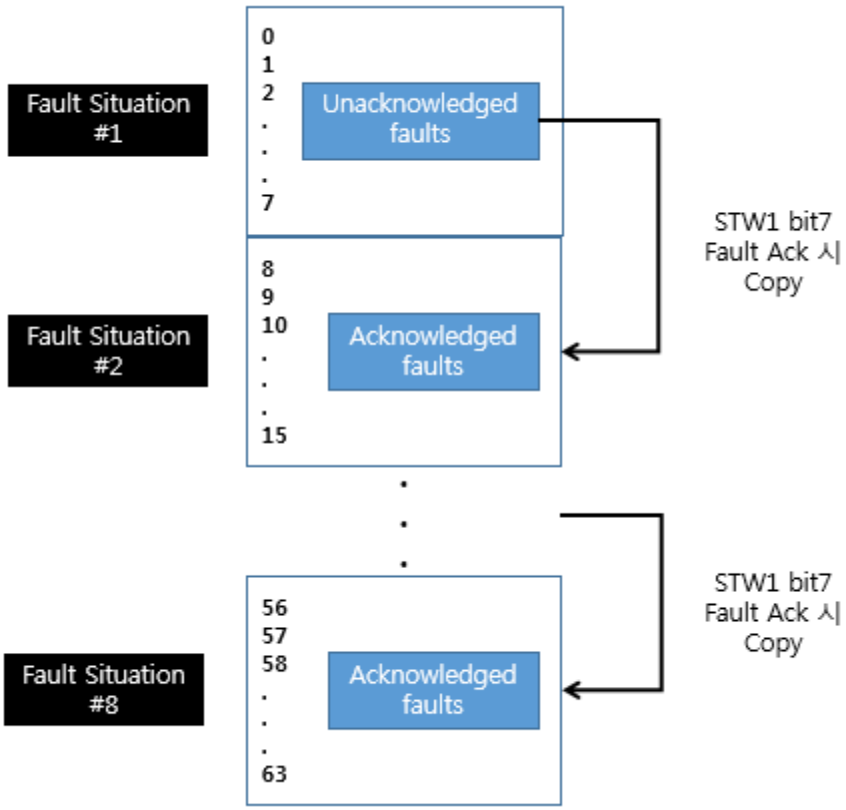
| Parameters | | | |
|---|---|---|---|
| PNU | R/W | Data Type | Description |
| 918 | R | Unsigned16 | Displays the selected node address in the FBus ID (COM-07). |
| 922 | R | Unsigned16 | Displays the selected cyclic telegram in the master's I/O configuration.<br>1 : Standard Telegram 1<br>100 : Vender Specific Telegram<br>101 : PPO Type 1 (PKW 4/4 + PZD 2/2)<br>102 : PPO Type 2 (PKW 4/4 + PZD 6/6)<br>103 : PPO Type 3 (PZD 2/2)<br>104 : PPO Type 4 (PZD 6/6)<br>105 : PPO Type 5 (PKW 4/4 + PZD 10/10)<br>106 : PPO Type 6 (PZD 10/10)<br>* 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.<br>1 : PROFIdrive Profile<br>0x8000 : I/O Profile<br>0x8002 : LS Drive Profile<br>* 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]<br>Unsigned16 | Fault number<br>* See description of PNU[944] Fault Message Counter and PNU[947] Fault Number. |
| 953 | R | Unsigned16 | Warning word<br>* Displays the value of the Warning Information parameter at inverter communication address 0h0334. |

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

## 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 |

| 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 |

**Rread/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.