

## INVERTER

# F510



## Communication - Addendum

Profibus DP

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# 1.0 PROFIBUS high speed communication expansion card

## 1.0.1 Communication hardware and data structure

This product is the PROFIBUS high-speed communication expansion module; it can perform remote setting and communication functions through the PROFIBUS bus. It is used on the TECO A510s/F510 AC motor driver (hereinafter referred to as the “driver”), and allows the driver to operate on the PROFIBUS network.

## 1.0.2 Product specifications

### PROFIBUS ports

| Item              | Specifications   |
|-------------------|--|
| Connector         | DB-9   |
| Transmission rate | 9.6Kbit/s to 12Mbit/s (automatic detection of transmission rate) |
| Network protocols | PROFIBUS communication protocol                                  |

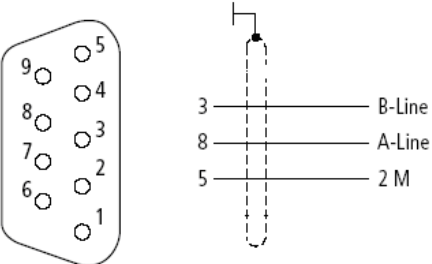
### AC motor driver port

| Item                    | Specifications   |
|-------------------------|--|
| Connector               | Control board CN2 connector  |
| Transmission method     | SPI high speed communication   |
| Terminal functions      | 1. The communication module communicates with the AC motor driver through this interface.<br>2. The AC motor driver provides power to the communication module through this interface. |
| Communication protocols | TECO communication protocol  |

### 1.0.3 Installation instructions

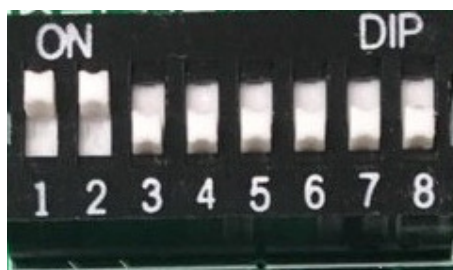
#### PROFIBUS network connection

Definitions of PROFIBUS DP communication port pins are as shown in the figure below.

|  | Pin | Definition         | Description              |
|---|-----|--------------------|--------------------------|
|   | 1~2 | Not assigned       | -                        |
|   | 3   | RXD/TXD-P (B-Line) | Receive/Send data -P     |
|   | 4   | Not assigned       | -                        |
|   | 5   | DGND (2M)          | Data reference potential |
|   | 6~7 | Not assigned       | -                        |
|   | 8   | RXD/TXD-N (A-Line) | Receive/Send data -N     |
|   | 9   | Not assigned       | -                        |

#### PROFIBUS network connection

As shown in the figure below, ID addresses (1~125) correspond to SW1 b1~b7.



| Function                | DIP switch position | DIP switch status | Description            |
|-------------------------|---------------------|-------------------|------------------------|
| Network address setting | b1~b7               | 1000000           | Network address is 1   |
|                         |                     | 0100000           | Network address is 2   |
|                         |                     | 1100000           | Network address is 3   |
|                         |                     | .....             | .....                  |
|                         |                     | 1011111           | Network address is 125 |
| No function             | b8                  | -                 | -                      |

Network address switch setting range: 1~125 (0, 128~255 cannot be used).

## PROFIBUS bus terminal resistor

5V

390Ω

220Ω

390Ω

ON ↑

SW DIP-2

B+

A-

Bus Terminating Resistors

The first and last station of the PROFIBUS bus must be connected to the bus, and the bus terminal resistor must be turned on.

### 1.0.4 LED indicator descriptions

The module has two dual-color LED indicators built-in used to quickly diagnose and monitor the communication statuses between the module itself and the bus.

#### Module status LED (RUN LED & ERR LED)

Used to monitor whether the equipment is operating normally.

| Indicator statuses         | Description  |
|----------------------------|--|
| Does not light up          | Power not supplied   |
| Orange light lights up     | Communication with the frequency converter not established |
| Red light flashes (1 Hz)   | Communication error with the frequency converter           |
| Red light flashes (4 Hz)   | Flip-switch ID address error                               |
| Green light flashes (4 Hz) | Power supply normal but DP communication not established   |
| Green light lights up      | DP communication normal                                    |

## Network status LED (COMM LED)

Used to monitor the operability of the communication module PROFIBUS network.

| Indicator statuses    | Description                             |
|-----------------------|---|
| Does not light up     | DP communication not established        |
| Green light lights up | DP communication established and normal |

### 1.0.5 Driver parameter setting descriptions

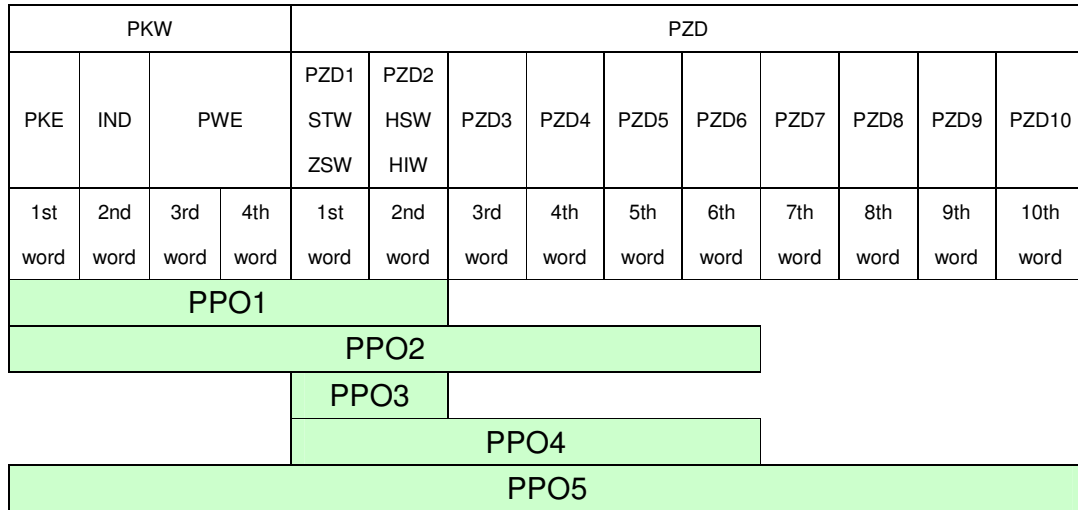
Used to monitor the operability of the communication module PROFIBUS network.

Users must first confirm related parameter settings on the driver in order to ensure that the communication module can connect normally.

| Parameters | Parameter name           | Settings | Settings descriptions |
|------------|--------------------------|----------|-----------------------|
| 00-02      | Operation command source | 2        | Communication control |
| 00-05      | Frequency command source | 3        | Communication control |

## 1.0.6 Connection instructions

### PPO communication



|                                     |                               |
|-------------------------------------|-------------------------------|
| <b>PKW:</b> Parameter address/value | <b>STW:</b> Control word      |
| <b>PZD:</b> Process data            | <b>ZSW:</b> Status word       |
| <b>PKE:</b> Parameter address       | <b>HSW:</b> Main settings     |
| <b>IND:</b> Subindex                | <b>HIW:</b> Main actual value |
| <b>PWE:</b> Parameter value         |                               |

### PZD Structure default

User parameters of the communication module configured through the GSD file. Default values of the PZD structure are as follows:

STW1 Control word; mapped to the MODBUS address 0x2501 of the driver.

HSW Main setting value; mapped to the MODBUS address 0x2502 of the driver.

ZSW1 Status word; mapped to the MODBUS address 0x2520 of the driver.

HIW Main actual value; mapped to the MODBUS address 0x2524 of the driver.

PLC Master station → driver slave station

PZD3/ PZD4: Not used.

Driver slave station → PLC master station

Driver output status; mapped to the MODBUS addresses 0x2520~0x252F of the driver.

The default values of PZD3/PZD4/PZD5/PZD6 are set as follows:

PZD3: Default multi-function terminal block on/off status; mapped to the MODBUS address 0x2522 of the driver.

PZD4: Default output current; mapped to the MODBUS address 0x2527 of the driver.

PZD5: Default output current; mapped to the MODBUS address 0x2521 of the driver.

PZD6: Default output current; mapped to the MODBUS address 0x2528 of the driver.

## 1.0.7 Meanings of each character

### Control character

| Bit | Description                          | 1       | 0       |
|-----|--------------------------------------|---------|---------|
| 0   | Operation command                    | Operate | Stop    |
| 1   | Reverse command                      | Reverse | Forward |
| 2   | External error                       | Error   | -       |
| 3   | Error reset                          | Reset   | -       |
| 4~5 | Reserved                             | -       | -       |
| 6   | Multi-function terminal S1           | ON      | OFF     |
| 7   | Multi-function terminal S2           | ON      | OFF     |
| 8   | Multi-function terminal S3           | ON      | OFF     |
| 9   | Multi-function terminal S4           | ON      | OFF     |
| A   | Multi-function terminal S5           | ON      | OFF     |
| B   | Multi-function terminal S6           | ON      | OFF     |
| C   | Multi-function terminal S7           | ON      | OFF     |
| D   | Multi-function terminal S8           | ON      | OFF     |
| E   | Controller mode                      | ON      | OFF     |
| F   | Communication setting torque command | ON      |         |

### Status character

| Bit | Meaning  | 1                    | 0                |
|-----|--|----------------------|------------------|
| 0   | Operation status                                 | Operate              | Stop             |
| 1   | Direction status                                 | Reverse              | Forward          |
| 2   | Frequency converter operation preparation status | Preparation complete | Not yet prepared |
| 3   | Error  | Abnormal             | Normal           |
| 4   | Warning  | ON                   | OFF              |
| 5   | Zero speed                                       | ON                   | OFF              |
| 6   | Model 440  | ON                   | OFF              |
| 7   | Frequency reached                                | ON                   | OFF              |
| 8   | Any frequency reached                            | ON                   | OFF              |
| 9   | Frequency detection one                          | ON                   | OFF              |
| A   | Frequency detection two                          | ON                   | OFF              |
| B   | Low voltage                                      | ON                   | OFF              |
| C   | Frequency converter no output                    | ON                   | OFF              |
| D   | Frequency not according to communication         | ON                   | OFF              |
| E   | SeqNotFromComm                                   | ON                   | OFF              |
| F   | Over-torque                                      | ON                   | OFF              |



## 1.0.8 PKW regional access parameters

The driver can provide request and response information. Due to the request and response mechanism, the master station must send requests until a communication response is received. The 4 characters of the PKW region are as follows:

|        |                            |    |                       |
|--------|----------------------------|----|-----------------------|
| Word 1 | Parameter ID(PKE)          |    |                       |
| bit    | 15                         | 12 | 11 0                  |
|        | AK                         |    | Parameter number(PNU) |
| Word 2 | IND Reserved               |    |                       |
| Word 3 | PWE1                       |    |                       |
| bit    | 15                         | 8  | 7 0                   |
|        | Reserved                   |    | Fault number          |
| Word 4 | PWE2 Read/Write parameters |    |                       |

### PKE

Bit 0~11 (PNU): Parameter address/MODBUS address that includes related parameters.

Parameter address/MODBUS address: Please refer to the MODBUS communication protocol description chapter in the driver manual for the register numbers, registers and data format that corresponds to the operation parameters.

Bit 12~15 (AK): Includes the identification characters of requests or responses.

### Request character AK

PLC master station → driver slave station

| Request Identifier | Description            |
|--------------------|------------------------|
| 0                  | No request             |
| 1                  | Read parameter value   |
| 2                  | Modify parameter value |

### Response character AK

Driver slave station → PLC master station

| Request Identifier | Description                            |
|--------------------|--|
| 0                  | No response                            |
| 1                  | Request parameter value processed      |
| 7                  | Request parameter value cannot process |

## Error character

If the request parameter value was not processed, then the error codes that will be kept in the low-bit PWE1 set are as follows:

| Error code | Description  |
|------------|--|
| 0          | Parameter does not exist   |
| 1          | The current status parameter cannot be read/written              |
| 2          | Parameter value not within range                                 |
| 101        | Other SP communication error occurred, such as: response timeout |

## PWE

Driver parameters are sent through PWE2 (4th word). In the following example, PWE1 (3rd word) must be set as 0 in the PROFIBUS master station.

### Example of the PKW mechanism:

For example: Read parameters 00-05 (frequency command source).

Read the values of 00-05; first set the request identification character as 1, and then refer to the MODBUS communication protocol description chapter in the driver manual to find out that the address of 00-05 is 0x0005, then the data sequences are as follows:

PLC master station → driver slave station: 1000 0005 0000 0000

Driver slave station → PLC master station: 1000 0005 0000 0004

| Request         |      |
|-----------------|------|
| 1st word (PKE)  | 1000 |
| 2nd word (IND)  | 0005 |
| 3rd word (PWE1) | 0000 |
| 4th word (PWE2) | 0000 |

| Response        |      |
|-----------------|------|
| 1st word (PKE)  | 1000 |
| 2nd word (IND)  | 0005 |
| 3rd word (PWE1) | 0000 |
| 4th word (PWE2) | 0004 |

## 1.0.9 Troubleshooting

There are two indicators on top of the PROFIBUS communication module; when malfunction occurs, the cause of the malfunction can be confirmed based on the indicator statuses, and troubleshoot the error by following the descriptions below.

### Indicator troubleshooting

#### Module status LED

| Indicator statuses                      | Status name                                    | Troubleshooting method  |
|---|--|---|
| Does not light up                       | Power not supplied to the communication module | <ol style="list-style-type: none"> <li>1. Confirm whether the driver power is normal.</li> <li>2. Confirm whether the power terminal of the communication module is connected to the driver.</li> </ol>   |
| Red and green light flashes alternately | Self-check                                     | <ol style="list-style-type: none"> <li>1. The host is under self-check; if it flashes continuously, disconnect the power and then reconnect it.</li> <li>2. Confirm whether the driver communication connection parameters are properly set (19200, 8, N, 1)</li> </ol> |
| Green light flashes                     | the communication module standby               | <ol style="list-style-type: none"> <li>1. Not yet connected with the driver.</li> </ol>   |

#### Network status LED

| Indicator statuses | Status name        | Description   |
|--------------------|--------------------|---|
| Does not light up  | Power not supplied | <ol style="list-style-type: none"> <li>1. Confirm whether the driver power is normal.</li> <li>2. Confirm whether the power terminal of the communication module is connected to the driver.</li> </ol> |
|                    | Standby            | <ol style="list-style-type: none"> <li>1. Not yet connected with the PROFIBUS host terminal.</li> </ol>   |

## 1.0.10 GSD File

When using the Profibus communication module, if the GSD description file (JN5-CMHI-PDP\_V (latest version).GSD) is needed, please download it from the TECO official website or request for it from your purchasing sales channel.

## 2.0 I/O expansion card

### 2.0.1 Hardware and data structure

This product is an I/O expansion module; it allows performing of I/O expansion functions through the SPI bus. Used with the TECO A510s/F510 AC motor driver (hereinafter referred to as a driver).

### 2.0.2 Product specifications

I/O ports

| Item      | Specifications          |
|-----------|-------------------------|
| Connector | TB1 7 external contacts |

### AC motor driver port

| Item                | Specifications                            |
|---------------------|---|
| Connector           | Control board CN2 connector/CN5 connector |
| Transmission method | SPI high speed communication              |
| Terminal functions  | TB1 7 external contacts                   |

**TECO**   **Westinghouse**

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***INVERTER***

**F510**

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