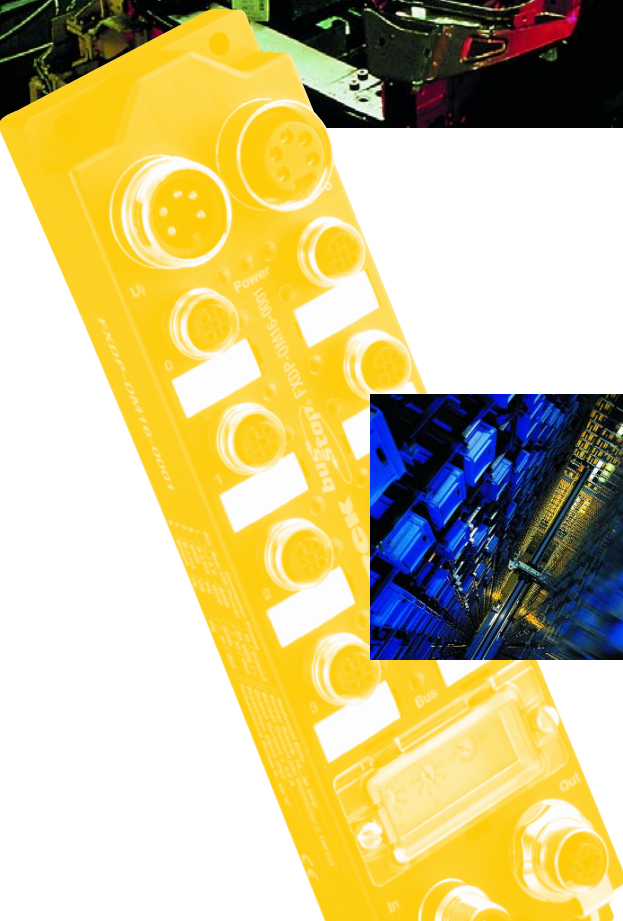




**TURCK**

Industrial  
Automation

**FXDP -  
USER MANUAL**



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2nd, revised edition 2004, 09/04

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Subject to alterations without notice.

## **Warning!**

### **Dangerous electrical voltage!**

#### **Before commencing the installation**

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighboring units that are live.
- Follow the engineering instructions of the device concerned.
- Only suitably qualified personnel in accordance with EN 50 110-1/-2 (VDE 0 105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalization. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60 364-4-41 (VDE 0 100 Part 410) or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60 204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause restart.

- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).
- The electrical installation must be carried out in accordance with the relevant regulations (e. g. with regard to cable cross sections, fuses, PE).
- All work relating to transport, installation, commissioning and maintenance must only be carried out by qualified personnel. (IEC 60 364 and HD 384 and national work safety regulations).
- All shrouds and doors must be kept closed during operation.

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## **About this manual**

### **Documentation concept**

This manual contains all information about the TURCK product family FXDP in protection class IP67.

The following chapters contain exact information about the general technical data and properties of each single module in the product family, a description of the coupling to PROFIBUS-DP as well as information about diagnosis and data mapping.

**General Information.**



**Attention**

Please read this section carefully. Safety aspects cannot be left to chance when dealing with electrical equipment.

**Prescribed Use**



**Warning**

The devices described in this manual must be used only in applications prescribed in this manual or in the respective technical descriptions, and only with certified components and devices from third party manufacturers.

Appropriate transport, storage, deployment and mounting as well as careful operating and thorough maintenance guarantee the trouble-free and safe operation of these devices.

**Notes Concerning Planning /Installation of this Product**



**Warning**

All respective safety measures and accident protection guidelines must be considered carefully and without exception.

### Description of Symbols Used



#### **Warning**

This sign can be found next to all notes that indicate a source of hazards. This can refer to danger to personnel or damage to the system (hardware and software) and to the facility.

This sign means for the operator: work with extreme caution.

---



#### **Attention**

This sign can be found next to all notes that indicate a potential hazard.

This can refer to possible danger to personnel and damages to the system (hardware and software) and to the facility.

---



#### **Note**

This sign can be found next to all general notes that supply important information about one or more operating steps. These specific notes are intended to make operation easier and avoid unnecessary work due to incorrect operation.

---



Index of modifications

Compared to the previous version of the manual, the following items have been modified or added:

| <i>Table 1:<br/>Index of<br/>modifications</i> | Modifications/ Additions                  | Chapter |
|------------------------------------------------|-------------------------------------------|---------|
|                                                | Approval of the modules for use in Zone 2 | 2 to 6  |
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## About this manual

# 1 The FXDP product family

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This chapter contains all information about the construction and the general technical data of the FXDP modules as well as about the their method of functioning.



---

**Note**

Please find all module-specific information in the module descriptions contained in the respective module chapters of the manual.

---

**General information**

The new FXDP product family shows the following proven module properties:

- rugged PROFIBUS-DP module
- glass-fibre reinforced plastic housing
- fully encapsulated electronics
- degree of protection IP67
- galvanic channel isolation to the PROFIBUS-DP
- short-circuit protected channels

Figure 1:  
FXDP module

**Note**

All modules of the product family FXDP are approved for use in Zone 2.

# The FXDP product family

## Product overview

Table 2:  
Product overview  
of the FXDP family

| User data section                        | FXDP-IM8-0001 | FXDP-IM16-0001 | FXDP-OM8-0001 | FXDP-OM16-0001 | FXDP-IOM88-0001 | FXDP-CSG88-0001 | FXDP-XSG16-0001 | Comment                                          |
|------------------------------------------|---------------|----------------|---------------|----------------|-----------------|-----------------|-----------------|--------------------------------------------------|
| 8 Bit IN                                 | x             |                |               |                |                 |                 | x               | I per connector                                  |
| 16 Bit IN                                |               | x              |               |                |                 |                 | x               | I/I per connector                                |
| 8 Bit OUT                                |               |                | x             |                |                 |                 | x               | O per connector                                  |
| 16 Bit OUT                               |               |                |               | x              |                 |                 | x               | O/O per connector                                |
| 8 Bit IN,<br>8 Bit OUT                   |               |                |               |                | x               |                 | x               | I/I or O/O per connector                         |
| 8 Bit IN,<br>8 Bit OUT                   |               |                |               |                |                 | x               | x               | I/O per connector                                |
| 8 Bit IN,<br>8 Bit DIAG                  |               |                |               |                |                 |                 | x               | I/DIAG per connector                             |
| 8 Bit OUT,<br>8 Bit DIAG                 |               |                |               |                |                 |                 | x               | O/DIAG per connector                             |
| 12 Bit IN,<br>4 Bit OUT                  |               |                |               |                |                 |                 | x               | I/I or O/O per connector                         |
| n Bit IN,<br>16-n Bit OUT<br>(AUTO Mode) |               |                |               |                |                 |                 | x               | outputs are read back                            |
| n Bit IN,<br>16-n Bit OUT<br>(PROG Mode) |               |                |               |                |                 |                 | x               | channel as IN,<br>inverted IN, DIAG IN<br>or OUT |
| AddOn:<br>Diag mapped                    | x             | x              | x             | x              | x               | x               | x               | diagnostics mapped<br>to user data section       |

### The service module

Besides the typical FXDP properties like the extended diagnosis, the possibility of diagnosis-data mapping into the user data as well as the comfortable M12-I/O-connection technology, the service module FXDP-XSG16-0001 provides the following additional features:

- Each single channel can be configured according to the application via configuration software tools (e.g. SIMATIC Manager, etc.). The required combination of in- and outputs can be exactly planned to suit the customer's needs. This thus ensures a 100% technology utilization and a cost minimization.
- Operating FXDP-modules can directly be replaced by the XSG-module. Without any additional configuration, it can take-over the function of the module that has to be replaced. The customer only has to change the hardware, to set the previously configured PROFIBUS-DP address at the XSG-module and to execute a voltage reset at the module.

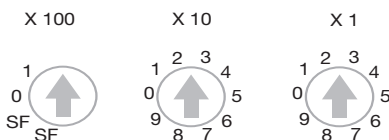
Based on this fact, the module is universally applicable and can be used to reduce inventory costs and system down-times - two factors that are constantly gaining in importance in face of ever more complex technical processes.

### Connection to PROFIBUS-DP

#### Addressing on PROFIBUS-DP

The PROFIBUS-DP address (1 to 126) is set via three decimal rotary coding switches located under a transparent protective cover.

*Figure 2:  
Setting the  
PROFIBUS-DP  
address*



#### Transmission rates

The module supports transmission rates of up to 12 Mbps and adjusts automatically to the transmission speed determined by the master.

#### Bus termination

The bus termination is realized via an external terminating resistor at Bus-OUT.

**Configuration files**

The configuration files for the software link are available via the internet under **www.turck.com** for download purposes.

The following table shows the corresponding configuration files for each single module:

*Table 3:*  
*Configuration files*

| <b>Module</b>   | <b>Configuration file</b> |
|-----------------|---------------------------|
| FXDP-IM8-0001   | TU0_ff1f.gsd              |
| FXDP-IM16-0001  | TU1_ff1f.gsd              |
| FXDP-OM8-0001   | TU2_ff1f.gsd              |
| FXDP-OM16-0001  | TU3_ff1f.gsd              |
| FXDP-IOM88-0001 | TU4_ff1f.gsd              |
| FXDP-CSG88-0001 | TU5_ff1f.gsd              |
| FXDP-XSG16-0001 | TU6_ff1f.gsd              |

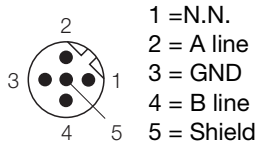
Connection possibilities

**PROFIBUS-DP**

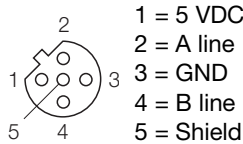
Module connection to the PROFIBUS-DP is established via two reverse-keyed M12 connectors.

Figure 3:  
M12x1-connector  
for connection to  
PROFIBUS-DP

**Male (IN)**



**Female (OUT)**

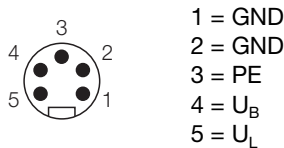


**Operating- / load voltage**

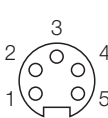
The module is powered via a 7/8" connector. The power is fed through via a second 7/8" connector.

Figure 4:  
7/8" connector for  
supplying and  
feeding through of  
supply voltage

**Male (U<sub>i</sub>)**



**Female (U<sub>o</sub>)**



**Note**

The operational voltage is monitored internally. Supply failures of less than 2.5 ms are compensated and thus do not lead to module malfunction. It is also ensured that a voltage reset cannot lead to generation of faulty signals.

### In-/ and outputs

The module is equipped throughout with 5-pole metal M12-connectors for connection of the sensor/actuator level.



---

#### **Note**

For the pin assignment, please refer to the wiring diagrams in the module-specific chapters of the manual.

---

## General technical data

### Technical data

Table 4:  
General technical  
data of FXDP  
modules

|                                              |                                                                                          |
|----------------------------------------------|------------------------------------------------------------------------------------------|
| Power supply                                 |                                                                                          |
| Operational voltage $U_B$                    | 24 VDC (18 ... 30 VDC)                                                                   |
| Load voltage $U_L$                           | 24 VDC (18 ... 30 VDC)                                                                   |
| Internal current consumption (via $U_B$ )    | < 70 mA                                                                                  |
| Connections                                  | nickel-plated brass connectors                                                           |
| PROFIBUS-DP                                  | 1 x male M12 connector (IN),<br>1 x female M12 connector (OUT),<br>5-pole, reverse-keyed |
| Power supply                                 | 1 x 7/8" male connector ( $U_i$ ),<br>1 x 7/8" female connector ( $U_o$ ),<br>5-pole     |
| Inputs/outputs                               | female M12-connectors, 5-pole                                                            |
| Housing                                      | PA6-GF30                                                                                 |
| Dimensions                                   | 220,5 x 60,4 x 27 mm (H x B x T)                                                         |
| Mounting                                     | via 4 through-holes Ø 5.4 mm                                                             |
| Degree of protection<br>(IEC 60529/EN 60529) | IP67                                                                                     |
| Vibration resistance test                    | according to<br>EN 60068-2-6,<br>IEC 68-2-47                                             |
| Shock resistance test                        | according to<br>EN 60068-2-27                                                            |
| EMC                                          | according to<br>EN 61000-6-2,<br>EN 61000-6-4                                            |

|                               |                                                                                                                                                  |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Approval for use in<br>Zone 2 | to EN 50014/2000,<br>EN 50021/2000 /<br> II 3 G EEx nA IIC T4 X |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|

---

**Temperature range**

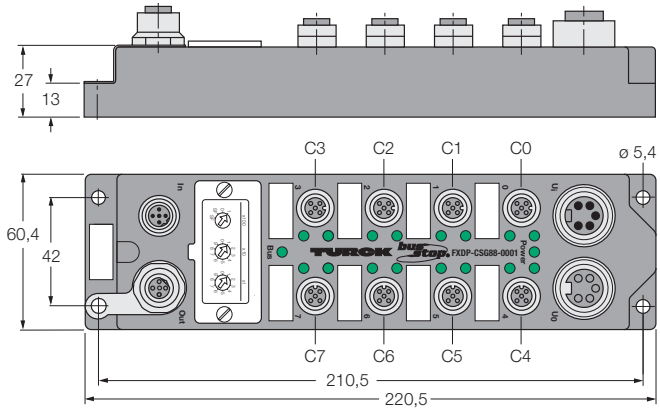
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|                            |                                         |
|----------------------------|-----------------------------------------|
| – Operating<br>temperature | 0 °C to +55 °C<br>(+32 °F to +131 °F)   |
| – Storage and<br>transport | -25 °C to +70 °C<br>(-13 °F to +158 °F) |

---

Dimension drawings

Figure 5:  
FXDP module-  
dimensions



LED indications

Table 5:  
FXDP  
LED indications

| LED          | Color | Meaning                                      |
|--------------|-------|----------------------------------------------|
| Bus          | green | communication with PROFIBUS-DP running       |
|              | red   | no communication to PROFIBUS-DP              |
| Power        | off   | $U_B < 18 \text{ VDC}$                       |
|              | green | $U_B$ and $U_L$ , within the operating range |
|              | red   | $U_L < 18 \text{ VDC}$                       |
| In-/ outputs | off   | not actuated, inactive                       |
|              | green | actuated, active                             |
|              | red   | channel overload                             |

### Diagnosis

1

These modules combine the advantages of channel diagnostics - as known from the PDP series - with the favorable compact housing dimensions of the FLDP series.

Output diagnostics are effective for each channel, whereas the sensor supply is monitored separately for each connector.

Diagnostic data are also transferred to the PROFIBUS-DP and the respective status is indicated via LEDs on the module individually for each channel.

Diagnostic data can also be reproduced and transferred within the user data area.



#### Note

Please read the corresponding sections in the module-specific chapters for any information about the diagnosis mapping in the process data image.

Channel-related diagnostics help increase system availability, because the type of error and its location can be determined in detail. According to PROFIBUS specifications, all diagnostic data are transferred to the higher level control system via the PROFIBUS-DP where these information can be evaluated by higher level masters.

Chapter 6 of this manual „Connection to a Siemens PLC S7” contains an example for plain-text diagnosis evaluation.

**The FXDP product family**

## 2 Digital Input Modules

|                                              |          |
|----------------------------------------------|----------|
| <b>Digital input module, 8-channel.....</b>  | <b>2</b> |
| FXDP-IM8-0001.....                           | 2        |
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| FXDP-IM16-0001.....                          | 6        |
| – Wiring diagram .....                       | 7        |
| – Technical Data .....                       | 7        |
| – Parameterization .....                     | 8        |
| – Diagnosis .....                            | 9        |

## Digital Input Modules

### Digital input module, 8-channel

#### **FXDP-IM8-0001**

The busstop® input station FXDP-IM8-0001 is a modular PROFIBUS-DP slave in a compact housing design.

The module is suited for connection of up to eight 2/3 wire pnp sensors or mechanical contacts.

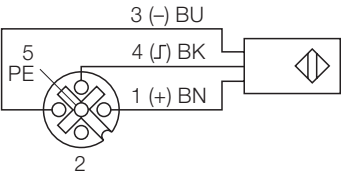
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Figure 6:  
FXDP-IM8-0001



Wiring diagram

Figure 7:  
Wiring diagram



Technical data

|                                             |                                 |                                                                  |
|---------------------------------------------|---------------------------------|------------------------------------------------------------------|
| Table 6:<br>Technical data<br>FXDP-IM8-0001 | Type                            | FXDP-IM8-0001                                                    |
|                                             | Configuration file              | TU0_ff1f.gsd                                                     |
|                                             | Inputs                          | (8) 2/3 wire pnp sensors                                         |
|                                             | Supply (via UB)                 | 24 VDC (18 ... 30 VDC)                                           |
|                                             | Supply current                  | < 120 mA per connector,<br>short-circuit protected               |
|                                             | Switching threshold<br>OFF/ON   | 2 mA/4 mA                                                        |
|                                             | Switching current<br>limitation | 6 mA                                                             |
|                                             | Switch-on delay                 | 2,5 ms                                                           |
|                                             | Switching frequency             | < 250 Hz                                                         |
|                                             | Galvanic isolation              | galvanic isolation to<br>PROFIBUS-DP                             |
|                                             | Housing                         |                                                                  |
|                                             | EMC                             | to EN 61000-6-2,<br>EN 61000-6-4;<br>EN 61326/1999; A1/1999      |
|                                             | Approval for use in<br>Zone 2   | to EN 50014/2000,<br>EN 50021/2000 /<br>Ⓔ II 3 G EEx nA IIC T4 X |

Parameterization

Table 7:  
parameter data  
assignment

| Param.-<br>Byte | Parameter                         | Meaning                               |
|-----------------|-----------------------------------|---------------------------------------|
| 0 to 6          | Standard DP parameters            | according to PROFIBUS-<br>DP standard |
| 7 to 9          | Standard DPV1 parameters          | according to PROFIBUS-<br>DP standard |
| 10 to 13        | defined:<br>1 input per connector | not parameterizable                   |
| 14 to 16        | reserved                          | -                                     |

Diagnosis

- diagnostic messages in the diagnosis telegram:

Table 8:  
Diagnostic  
messages

| Diagnostic message | Meaning                                                           |
|--------------------|-------------------------------------------------------------------|
| Short circuit      | Channel wise diagnosis for short circuits at the connected sensor |
| Undervoltage       | Operating voltage $U_B < 18 \text{ VDC}$ .                        |

- diagnosis in process data image

Table 9:  
process data

| Input    | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Byte 0   | C7P4  | C6P4  | C5P4  | C4P4  | C3P4  | C2P4  | C1P4  | C0P4  |
| Diagn. A | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0   |       |       |       |       |       | $U_B$ | $U_L$ | SC    |
| Byte1    | SC 7  | SC 6  | SC 5  | SC 4  | SC 3  | SC 2  | SC 1  | SC 0  |
| Byte2    | SC 15 | SC 14 | SC 13 | SC 12 | SC 11 | SC 10 | SC 9  | SC 8  |
| Byte3    | Con 7 | Con 6 | Con 5 | Con 4 | Con 3 | Con 2 | Con 1 | Con 0 |

**A** Depending on the configuration, the manufacturer specific diagnosis data can be mapped into the user data area.

|       |                                      |
|-------|--------------------------------------|
| CxPy  | Status: connector x, pin y           |
| SC    | Common short-circuit indication      |
| SCx   | Short-circuit indication channel x   |
| Conx  | Overload sensor voltage: connector x |
| $U_B$ | $U_B < 18 \text{ VDC}$               |
| $U_L$ | $U_L < 18 \text{ VDC}$               |
|       | Bit is not used                      |

## Digital Input Modules

### Digital input module, 16-channel

#### **FXDP-IM16-0001**

The busstop® input station FXDP-IM16-0001 is a modular PROFIBUS-DP slave in a compact housing design.

The module is suited for connection of up to sixteen 2/3 wire pnp sensors or mechanical contacts.

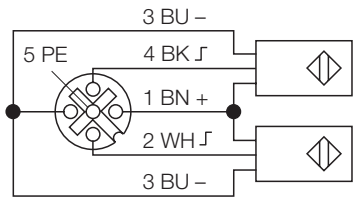
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Figure 8:  
FXDP-IM16-0001



Wiring diagram

Figure 9:  
Wiring diagram



Technical Data

|                                               |                                 |                                                                   |
|-----------------------------------------------|---------------------------------|-------------------------------------------------------------------|
| Table 10:<br>technical Data<br>FXDP-IM16-0001 | Type                            | FXDP-IM16-0001                                                    |
|                                               | Configuration file              | TU1_ff1f.gsd                                                      |
|                                               | Inputs                          | (16) 2/3 wire pnp sensors                                         |
|                                               | Supply (via UB)                 | 24 VDC (18 ... 30 VDC)                                            |
|                                               | Supply current                  | < 120 mA per connector,<br>short-circuit protected                |
|                                               | Switching threshold<br>OFF/ON   | 2 mA/4 mA                                                         |
|                                               | Switching current<br>limitation | 6 mA                                                              |
|                                               | Switch-on delay                 | 2,5 ms                                                            |
|                                               | Switching frequency             | < 250 Hz                                                          |
|                                               | Galvanic isolation              | galvanic isolation to<br>PROFIBUS-DP                              |
|                                               | Housing                         |                                                                   |
|                                               | EMC                             | to EN 61000-6-2,<br>EN 61000-6-4;<br>EN 61326/1999; A1/1999       |
|                                               | Approval for use in<br>Zone 2   | to EN 50014/2000,<br>EN 50021/2000 /<br>Ex II 3 G EEx nA IIC T4 X |
|                                               |                                 |                                                                   |
|                                               |                                 |                                                                   |

Parameterization

Table 11:  
parameter data  
assignment

| Param.-<br>Byte | Parameter                          | Meaning                              |
|-----------------|------------------------------------|--------------------------------------|
| 0 to 6          | Standard DP parameters             | according to<br>PROFIBUS-DP standard |
| 7 to 9          | Standard DPV1 parameters           | according to<br>PROFIBUS-DP standard |
| 10 to 13        | defined:<br>2 inputs per connector | not parameterizable                  |
| 14 to 16        | reserved                           | -                                    |

Diagnosis

- diagnostic messages in diagnosis telegram:

Table 12:  
Diagnostic  
messages

| Diagnostic message | Meaning                                                           |
|--------------------|-------------------------------------------------------------------|
| Short circuit      | Channel wise diagnosis for short circuits at the connected sensor |
| Undervoltage       | Operating voltage $U_B < 18\text{ V}$ .                           |

- diagnosis in process data image

Table 13:  
process data

| Input    | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Byte 0   | C7P4  | C6P4  | C5P4  | C4P4  | C3P4  | C2P4  | C1P4  | C0P4  |
| Diagn. A | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0   |       |       |       |       |       | $U_B$ | $U_L$ | SC    |
| Byte1    | SC 7  | SC 6  | SC 5  | SC 4  | SC 3  | SC 2  | SC 1  | SC 0  |
| Byte2    | SC 15 | SC 14 | SC 13 | SC 12 | SC 11 | SC 10 | SC 9  | SC 8  |
| Byte3    | Con 7 | Con 6 | Con 5 | Con 4 | Con 3 | Con 2 | Con 1 | Con 0 |

- A** Depending on the configuration, the manufacturer specific diagnosis data can be mapped into the user data area.

|       |                                      |
|-------|--------------------------------------|
| CxPy  | Status: connector x, pin y           |
| SC    | Common short-circuit indication      |
| SCx   | Short-circuit indication channel x   |
| Conx  | Overload sensor voltage: connector x |
| $U_B$ | $U_B < 18\text{ VDC}$                |
| $U_L$ | $U_L < 18\text{ VDC}$                |
|       | Bit is not used                      |



### 3 Digital Output Modules

|                                                |          |
|------------------------------------------------|----------|
| <b>Digital output module, 8-channel .....</b>  | <b>2</b> |
| FXDP-OM8-0001 .....                            | 2        |
| – Wiring diagram .....                         | 3        |
| – Technical data .....                         | 3        |
| – Parameterization .....                       | 4        |
| – Diagnosis .....                              | 5        |
| <b>Digital output module, 16-channel .....</b> | <b>6</b> |
| FXDP-OM16-0001 .....                           | 6        |
| – Wiring diagram .....                         | 7        |
| – Technical data .....                         | 7        |
| – Parameterization .....                       | 8        |
| – Diagnosis .....                              | 9        |

## Digital Output Modules

### Digital output module, 8-channel

#### **FXDP-OM8-0001**

The busstop® output station FXDP-OM8-0001 is a modular PROFIBUS-DP slave in a compact housing design.

Up to eight DC actuators with a maximum output current of 1.4 A per output can be connected.

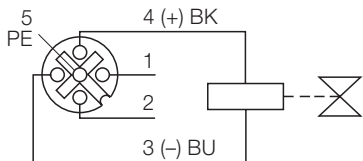
---

Figure 10:  
FXDP-OM8-0001



Wiring diagram

Figure 11:  
Wiring diagram



Technical data

Table 14:

Technical data  
FXDP-OM8-0001

|                                   |                                                                               |
|-----------------------------------|-------------------------------------------------------------------------------|
| Type                              | FXDP-OM8-0001                                                                 |
| Configuration file                | TU2_ff1f.gsd                                                                  |
| Outputs                           | (8) DC-actuators                                                              |
| Load supply (via U <sub>L</sub> ) | 24 VDC (18 ... 30 VDC)                                                        |
| Output current                    | 1,4 A, short-circuit protected<br>(ON period = 50 %)                          |
| Switching frequency               | < 250 Hz                                                                      |
| Galvanic isolation                | galvanic isolation to<br>PROFIBUS-DP                                          |
| Housing                           |                                                                               |
| EMC                               | to EN 61000-6-2,<br>EN 61000-6-4;<br>EN 61326/1999; A1/1999                   |
| Approval for use in<br>Zone 2     | to EN 50014/2000,<br>EN 50021/2000 /<br>Ⓔ <sub>x</sub> II 3 G EEx nA IIC T4 X |

Parameterization

Table 15:  
Parameter data  
assignment

| Param.-<br>Byte | Parameter                                                                                                                        | Meaning                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 0 to 6          | Standard DP parameters                                                                                                           | according to PROFIBUS-<br>DP standard  |
| 7 to 9          | Standard DPV1 parameters                                                                                                         | according to PROFIBUS-<br>DP standard  |
| 10 to 13        | defined:<br>1 output per connector                                                                                               | not parameterizable                    |
| 14 and<br>15    | reserved                                                                                                                         | -                                      |
| 16              | U <sub>L</sub> diagnosis<br>00 = diagnosis is not trans-<br>ferred via the bus<br>01 = diagnosis is trans-<br>ferred via the bus | Activation of U <sub>L</sub> diagnosis |

Diagnosis

- diagnostic messages in diagnosis telegram:

Table 16:  
Diagnostic  
messages

| Diagnostic message   | Meaning                                                              |
|----------------------|----------------------------------------------------------------------|
| Short circuit        | Channel wise diagnosis for short circuits at the connected actuator. |
| Undervoltage         | Operation voltage $U_B$ missing or $< 18\text{ VDC}$                 |
| Load voltage missing | Load voltage $U_L$ missing or $< 18\text{ VCD}$                      |

- diagnosis in process data image

Table 17:  
process data

| Output   | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Byte 0   | C7P4  | C6P4  | C5P4  | C4P4  | C3P4  | C2P4  | C1P4  | C0P4  |
| Diagn. A | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0   |       |       |       |       |       | $U_B$ | $U_L$ | SC    |
| Byte1    | SC 7  | SC 6  | SC 5  | SC 4  | SC 3  | SC 2  | SC 1  | SC 0  |
| Byte2    | SC 15 | SC 14 | SC 13 | SC 12 | SC 11 | SC 10 | SC 9  | SC 8  |
| Byte3    | Con 7 | Con 6 | Con 5 | Con 4 | Con 3 | Con 2 | Con 1 | Con 0 |

**A** Depending on the configuration, the manufacturer specific diagnosis data can be mapped into the user data area.

|       |                                      |
|-------|--------------------------------------|
| CxPy  | Status: connector x, pin y           |
| SC    | Common short-circuit indication      |
| SCx   | Short-circuit indication channel x   |
| Conx  | Overload sensor voltage: connector x |
| $U_B$ | $U_B < 18\text{ VDC}$                |
| $U_L$ | $U_L < 18\text{ VDC}$                |
|       | Bit is not used                      |

### Digital output module, 16-channel

#### **FXDP-OM16-0001**

The busstop® output station FXDP-OM16-0001 is a modular PROFIBUS-DP slave in a compact housing design.

Up to sixteen DC actuators with a maximum output current of 1.4 A per output can be connected.

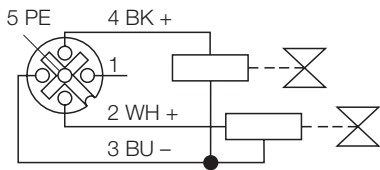
---

Figure 12:  
FXDP-OM16-0001



Wiring diagram

Figure 13:  
Wiring diagram



Technical data

|                                               |                                   |                                                                  |
|-----------------------------------------------|-----------------------------------|------------------------------------------------------------------|
| Table 18:<br>Technical data<br>FXDP-OM16-0001 | Type                              | FXDP-OM16-0001                                                   |
|                                               | Configuration file                | TU3_ff1f.gsd                                                     |
|                                               | Outputs                           | (16) DC-actuators                                                |
|                                               | Load supply (via U <sub>L</sub> ) | 24 VDC (18 ... 30 VDC)                                           |
|                                               | Output current                    | 1,4 A, short-circuit protected<br>(ON period = 50 %)             |
|                                               | Switching frequency               | < 250 Hz                                                         |
|                                               | Galvanic isolation                | galvanic isolation to<br>PROFIBUS-DP                             |
|                                               | Housing                           |                                                                  |
|                                               | EMC                               | to EN 61000-6-2,<br>EN 61000-6-4;<br>EN 61326/1999; A1/1999      |
|                                               | Approval for use in<br>Zone 2     | to EN 50014/2000,<br>EN 50021/2000 /<br>Ⓔ II 3 G EEx nA IIC T4 X |

Parameterization

Table 19:  
Parameter data  
assignment

| Param.-<br>Byte | Parameter                                                                                                                        | Meaning                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 0 to 6          | Standard DP parameters                                                                                                           | according to PROFIBUS-<br>DP standard  |
| 7 to 9          | Standard DPV1 parameters                                                                                                         | according to PROFIBUS-<br>DP standard  |
| 10 to 13        | defined:<br>2 Outputs per connector                                                                                              | not parameterizable                    |
| 14 and<br>15    | reserved                                                                                                                         | -                                      |
| 16              | U <sub>L</sub> diagnosis<br>00 = diagnosis is not trans-<br>ferred via the bus<br>01 = diagnosis is trans-<br>ferred via the bus | Activation of U <sub>L</sub> diagnosis |

Diagnosis

- diagnostic messages in the diagnosis telegram

Table 20:  
Diagnostic  
messages

| Diagnostic message   | Meaning                                                              |
|----------------------|----------------------------------------------------------------------|
| Short circuit        | Channel wise diagnosis for short circuits at the connected actuator. |
| Undervoltage         | Operation voltage $U_B$ missing or $< 18 \text{ VDC}$                |
| Load voltage missing | Load voltage $U_L$ missing or $< 18 \text{ VDC}$                     |

- diagnosis in process data image

Table 21:  
process data

| Output   | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Byte 0   | C3P2  | C3P4  | C2P2  | C2P4  | C1P2  | C1P4  | C0P2  | C0P4  |
| Byte 1   | C7P2  | C7P4  | C6P2  | C6P4  | C5P2  | C5P4  | C4P2  | C4P4  |
| Diagn. A | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0   |       |       |       |       |       | $U_B$ | $U_L$ | SC    |
| Byte1    | SC 7  | SC 6  | SC 5  | SC 4  | SC 3  | SC 2  | SC 1  | SC 0  |
| Byte2    | SC 15 | SC 14 | SC 13 | SC 12 | SC 11 | SC 10 | SC 9  | SC 8  |
| Byte3    | Con 7 | Con 6 | Con 5 | Con 4 | Con 3 | Con 2 | Con 1 | Con 0 |

**A** Depending on the configuration, the manufacturer specific diagnosis data can be mapped into the user data area.

|       |                                      |
|-------|--------------------------------------|
| CxPy  | Status: connector x, pin y           |
| SC    | Common short-circuit indication      |
| SCx   | Short-circuit indication channel x   |
| Conx  | Overload sensor voltage: connector x |
| $U_B$ | $U_B < 18 \text{ VDC}$               |
| $U_L$ | $U_L < 18 \text{ VDC}$               |
|       | Bit is not used                      |



## 4 Digital Hybrid Modules

### **Digital hybrid module, 2 x 8-channel, I/I or O/O per connector ..... 2**

|                          |   |
|--------------------------|---|
| FXDP-IOM88-0001 .....    | 2 |
| – Wiring diagrams .....  | 3 |
| – Technical data .....   | 4 |
| – Parameterization ..... | 5 |
| – Diagnosis .....        | 5 |

### **Digital combined module, 2 x 8-channel, I/O per connector ..... 7**

|                          |    |
|--------------------------|----|
| FXDP-CSG88-0001 .....    | 7  |
| – Wiring diagram .....   | 8  |
| – Technical data .....   | 9  |
| – Parameterization ..... | 10 |
| – Diagnosis .....        | 10 |

### Digital hybrid module, 2 x 8-channel, I/I or O/O per connector

#### **FXDP-IOM88-0001**

The busstop® input/output station FXDP-IOM88-0001 is a modular PROFIBUS-DP slave in a compact housing design.

Up to eight 2/3 wire pnp sensors and eight DC actuators with a maximum output current of 1.4 A per output can be connected.

The inputs and outputs are provided equidirectionally via four connectors.

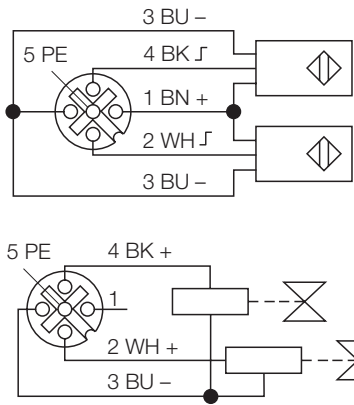
---

Figure 14:  
FXDP-IOM88-0001



Wiring diagrams

Figure 15:  
Wiring diagrams



## Technical data

Table 22:

Technical data

FXDP-IOM88-0001

|                                 |                                                                  |
|---------------------------------|------------------------------------------------------------------|
| Type                            | FXDP-IOM88-0001                                                  |
| Configuration file              | TU4_ff1f.gsd                                                     |
| Inputs                          | (8) 2/3 wire pnp sensors                                         |
| Supply (via $U_B$ )             | 24 VDC (18 ... 30 VDC)                                           |
| Supply current                  | < 120 mA per connector,<br>short-circuit protected               |
| Switching threshold<br>OFF/ON   | 2 mA/4 mA                                                        |
| Switching current<br>limitation | 6 mA                                                             |
| Switch-on delay                 | 2,5 ms                                                           |
| Switching frequency             | < 250 Hz                                                         |
| Galvanic isolation              | galvanic isolation to PROFIBUS-DP                                |
| Outputs                         | (8) DC-actuators                                                 |
| Load supply (via $U_L$ )        | 24 VDC (18 ... 30 VDC)                                           |
| Output current                  | 1.4 A, short-circuit protected<br>(ON period = 50 %)             |
| Switching frequency             | < 250 Hz                                                         |
| Galvanic isolation              | galvanic isolation to PROFIBUS-DP                                |
| Housing                         |                                                                  |
| EMC                             | to EN 61000-6-2,<br>EN 61000-6-4;<br>EN 61326/1999; A1/1999      |
| Approval for use in<br>Zone 2   | to EN 50014/2000,<br>EN 50021/2000 /<br>Ⓔ II 3 G EEx nA IIC T4 X |

**Parameterization**

Table 23:  
Parameter data  
assignment

| Param.-<br>Byte | Parameter                                                                                                              | Meaning                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 0 to 6          | Standard DP parameters                                                                                                 | according to PROFIBUS-DP standard                                                    |
| 7 to 9          | Standard DPV1 parameters                                                                                               | according to PROFIBUS-DP standard                                                    |
| 10 and<br>11    | 00, 00<br>not parameterizable                                                                                          | The connectors 0-3 are defined as inputs, the connectors 4-7 are defined as outputs. |
| 12 and<br>13    | AA, AA<br>not parameterizable                                                                                          |                                                                                      |
| 14 and<br>15    | reserved                                                                                                               | -                                                                                    |
| 16              | U <sub>L</sub> diagnosis<br>00 = diagnosis is not transferred via the bus<br>01 = diagnosis is transferred via the bus | Activation of U <sub>L</sub> diagnosis                                               |

**Diagnosis**

- diagnostic messages in the diagnosis telegram:

Table 24:  
Diagnostic  
messages

| Diagnostic<br>message   | Meaning                                                                      |
|-------------------------|------------------------------------------------------------------------------|
| Short circuit           | Channel wise diagnosis for short circuits at the connected sensor/ actuator. |
| Undervoltage            | Operation voltage U <sub>B</sub> missing or < 18 VDC                         |
| Load voltage<br>missing | Load voltage U <sub>L</sub> missing or < 18 VDC                              |

■ diagnosis in process data image

Table 25:  
process data

| Input    | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
|----------|-------|-------|-------|-------|-------|----------------|----------------|-------|
| Byte 0   | C3P2  | C3P4  | C2P2  | C2P4  | C1P2  | C1P4           | C0P2           | C0P4  |
| Output   | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
| Byte 0   | C7P2  | C7P4  | C6P2  | C6P4  | C5P2  | C5P4           | C4P2           | C4P4  |
| Diagn. A | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
| Byte 0   |       |       |       |       |       | U <sub>B</sub> | U <sub>L</sub> | SC    |
| Byte1    | SC 7  | SC 6  | SC 5  | SC 4  | SC 3  | SC 2           | SC 1           | SC 0  |
| Byte2    | SC 15 | SC 14 | SC 13 | SC 12 | SC 11 | SC 10          | SC 9           | SC 8  |
| Byte3    | Con 7 | Con 6 | Con 5 | Con 4 | Con 3 | Con 2          | Con 1          | Con 0 |

**A** Depending on the configuration, the manufacturer specific diagnosis data can be mapped into the user data area.

|                |                                      |
|----------------|--------------------------------------|
| CxPy           | Status: connector x, pin y           |
| SC             | Common short-circuit indication      |
| SCx            | Short-circuit indication channel x   |
| Conx           | Overload sensor voltage: connector x |
| U <sub>B</sub> | U <sub>B</sub> < 18 VDC              |
| U <sub>L</sub> | U <sub>L</sub> <18 VDC               |
| ■              | Bit is not used                      |

### **FXDP-CSG88-0001**

The busstop<sup>®</sup> input/output station FXDP-CSG88-0001 is a modular PROFIBUS-DP slave in a compact housing design.

Up to eight 2/3 wire pnp sensors and eight DC actuators with a maximum output current of 1.4 A per output can be connected.

The inputs and outputs are provided in combination by eight connectors.

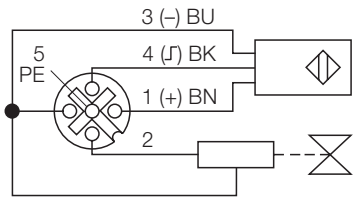
4

Figure 16:  
FXDP-CSG88-0001



Wiring diagram

Figure 17:  
Wiring diagram



**Technical data**

Table 26:

Technical data

FXDP-CSG88-0001

|                                 |                                                                  |
|---------------------------------|------------------------------------------------------------------|
| Type                            | FXDP-CSG88-0001                                                  |
| Configuration file              | TU5_ff1f.gsd                                                     |
| Inputs                          | (8) 2/3 wire pnp sensors                                         |
| Supply (via $U_B$ )             | 24 VDC (18 ... 30 VDC)                                           |
| Supply current                  | < 120 mA per connector,<br>short-circuit protected               |
| Switching threshold<br>OFF/ON   | 2 mA/4 mA                                                        |
| Switching current<br>limitation | 6 mA                                                             |
| Switch-on delay                 | 2,5 ms                                                           |
| Switching frequency             | < 250 Hz                                                         |
| Galvanic isolation              | galvanic isolation to PROFIBUS-DP                                |
| Outputs                         | (8) DC-actuators                                                 |
| Load supply (via $U_L$ )        | 24 VDC (18 ... 30 VDC)                                           |
| Output current                  | 1.4 A, short-circuit protected<br>(ON period = 50 %)             |
| Switching frequency             | < 250 Hz                                                         |
| Galvanic isolation              | galvanic isolation to PROFIBUS-DP                                |
| Housing                         |                                                                  |
| EMC                             | to EN 61000-6-2,<br>EN 61000-6-4;<br>EN 61326/1999; A1/1999      |
| Approval for use in<br>Zone 2   | to EN 50014/2000,<br>EN 50021/2000 /<br>Ⓔ II 3 G EEx nA IIC T4 X |

Parameterization

Table 27:  
Parameter data  
assignment

| Param.-<br>Byte | Parameter                                                                                                              | Meaning                                                      |
|-----------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| 0 to 6          | Standard DP parameters                                                                                                 | according to PROFIBUS-DP standard                            |
| 7 to 9          | Standard DPV1 parameters                                                                                               | according to PROFIBUS-DP standard                            |
| 10 and<br>11    | 88, 88<br>not parameterizable                                                                                          | Pin 2 of the connectors is defined a output, pin 4 as input. |
| 12 and<br>13    | 88, 88<br>not parameterizable                                                                                          |                                                              |
| 14 and<br>15    | reserved                                                                                                               | -                                                            |
| 16              | U <sub>L</sub> diagnosis<br>00 = diagnosis is not transferred via the bus<br>01 = diagnosis is transferred via the bus | Activation of U <sub>L</sub> diagnosis                       |

Diagnosis

■ diagnostic messages in the diagnosis telegram:

Table 28:  
Diagnostic  
messages

| Diagnostic<br>message   | Meaning                                                                      |
|-------------------------|------------------------------------------------------------------------------|
| Short circuit           | Channel wise diagnosis for short circuits at the connected sensor/ actuator. |
| Undervoltage            | Operation voltage U <sub>B</sub> missing or < 18 VDC                         |
| Load voltage<br>missing | Load voltage U <sub>L</sub> missing or < 18 VDC                              |



■ diagnosis in process data image

Table 29:  
process data

| Input    | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
|----------|-------|-------|-------|-------|-------|----------------|----------------|-------|
| Byte 0   | C7P4  | C6P4  | C5P4  | C4P4  | C3P4  | C2P4           | C1P4           | C0P4  |
| Output   | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
| Byte 0   | C7P2  | C6P2  | C5P2  | C4P2  | C3P2  | C2P2           | C1P2           | C0P2  |
| Diagn. A | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
| Byte 0   |       |       |       |       |       | U <sub>B</sub> | U <sub>L</sub> | SC    |
| Byte1    | SC 7  | SC 6  | SC 5  | SC 4  | SC 3  | SC 2           | SC 1           | SC 0  |
| Byte2    | SC 15 | SC 14 | SC 13 | SC 12 | SC 11 | SC 10          | SC 9           | SC 8  |
| Byte3    | Con 7 | Con 6 | Con 5 | Con 4 | Con 3 | Con 2          | Con 1          | Con 0 |

**A** Depending on the configuration, the manufacturer specific diagnosis data can be mapped into the user data area.

|                |                                      |
|----------------|--------------------------------------|
| CxPy           | Status: connector x, pin y           |
| SC             | Common short-circuit indication      |
| SCx            | Short-circuit indication channel x   |
| Conx           | Overload sensor voltage: connector x |
| U <sub>B</sub> | U <sub>B</sub> < 18 VDC              |
| U <sub>L</sub> | U <sub>L</sub> <18 VDC               |
|                | Bit is not used                      |



## 5 Universal Service Module

|                                                       |          |
|-------------------------------------------------------|----------|
| <b>FXDP-XSG16-0001 .....</b>                          | <b>2</b> |
| The service module .....                              | 2        |
| Block diagram .....                                   | 4        |
| Wiring diagrams .....                                 | 5        |
| Technical data .....                                  | 6        |
| Configuration options .....                           | 7        |
| Parameterization .....                                | 8        |
| Diagnosis .....                                       | 9        |
| – Diagnostic messages in the diagnosis telegram ..... | 9        |
| – Diagnosis in the process data image .....           | 10       |

### FXDP-XSG16-0001

The busstop<sup>®</sup> input/output station FXDP-XSG16-0001 is a modular PROFIBUS-DP slave in a compact housing design. The module is equipped with sixteen channels, which can be configured differently depending on the specific application requirements. Up to sixteen 2/3 wire pnp sensors or sixteen DC actuators with a maximum output current of 1.4 A per output can be connected.

#### The service module

Besides the typical FXDP properties like the extended diagnosis, the possibility of diagnosis-data mapping into the user data as well as the FIXCON<sup>®</sup> I/O-connection technology, the service module FXDP-XSG16-0001 provides the following additional features:

- Each single channel can be configured according to the application via configuration software tools (e.g. SIMATIC Manager, etc.). The required combination of in- and outputs can be exactly planned to suit the customer's needs. The device's configuration options enable the user to operate the module in the "AUTO mode" or to use the individual channels as an input, as an inverted input, as a diagnostic input or as an output. This thus ensures a 100% technology utilization and a cost minimization.
- Operating FXDP-modules can directly be replaced by the XSG-module. Without any additional configuration, it can take-over the function of the module that has to be replaced. The customer only has to change the hardware, to set the previously configured PROFIBUS-DP address at the XSG-module and to execute a voltage reset at the module.

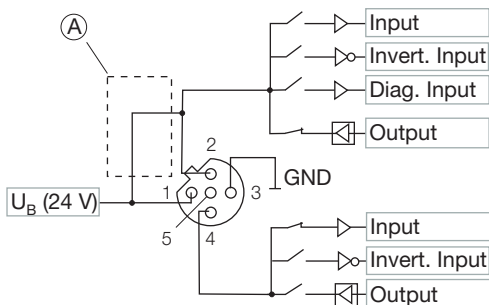
Based on this fact, the module is universally applicable and can be used to reduce inventory costs and system down-times - two factors that are constantly gaining in importance in face of ever more complex technical processes.

Figure 18:  
FXDP-XSG16-0001



## Block diagram

Figure 19:  
Block diagram  
FXDP-XSG16-0001



- (A) Wire-break detection via external bridge between PIN 2 and  $U_B$ . Only realizable with the parameterization of PIN 2 as "Diag. Input".

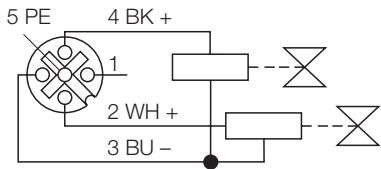
Pin 2 = channel 1, 3, 5,... (all impair channel numbers)

Pin 4 = channel 0, 2, 4 ...(all pair channel numbers)

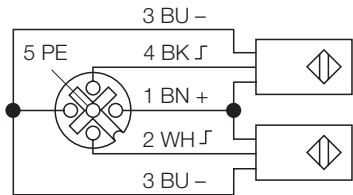
Wiring diagrams

Figure 20:  
Wiring diagrams

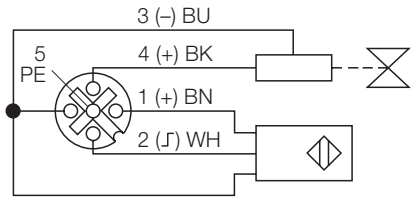
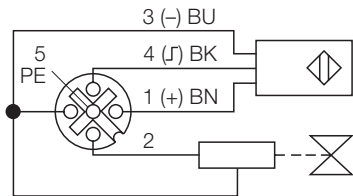
Connection of 2 actuators:



Connection of 2 sensors:



Combinations of sensor and actuator:



## Technical data

Table 30:

Technical data

FXDP-XSG16-0001

|                                   |                                                                                                                                                    |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                              | FXDP-XSG16-0001                                                                                                                                    |
| Configuration file                | TU6_ff1f.gsd                                                                                                                                       |
| Inputs (configurable)             | ((n) 2/3 wire pnp sensors (n = 0...16))                                                                                                            |
| Supply (via U <sub>B</sub> )      | 24 VDC (18 ... 30 VDC)                                                                                                                             |
| Supply current                    | < 120 mA per connector, short-circuit protected                                                                                                    |
| Switching threshold<br>OFF/ON     | 2 mA/4 mA                                                                                                                                          |
| Switching current<br>limitation   | 6 mA                                                                                                                                               |
| Switch-on delay                   | 2,5 ms                                                                                                                                             |
| Switching frequency               | < 250 Hz                                                                                                                                           |
| Galvanic isolation                | galvanic isolation to PROFIBUS-DP                                                                                                                  |
| Outputs (configurable)            | (16-n) DC actuators (n = 0...16)                                                                                                                   |
| Load supply (via U <sub>L</sub> ) | 24 VDC (18 ... 30 VDC)                                                                                                                             |
| Output current                    | 1.4 A, short-circuit protected (ON period = 35 %)                                                                                                  |
| Switching frequency               | < 250 Hz                                                                                                                                           |
| Galvanic isolation                | galvanic isolation to PROFIBUS-DP                                                                                                                  |
| Housing                           |                                                                                                                                                    |
| EMC                               | to EN 61000-6-2,<br>EN 61000-6-4;<br>EN 61326/1999; A1/1999                                                                                        |
| Approval for use in<br>Zone 2     | to EN 50014/2000,<br>EN 50021/2000 /<br> II 3 G EEx nA IIC T4 X |



Configuration options

Table 31:  
Configuration  
options for the  
universal service  
module

| User data<br>area                        | FXDP-IM8-0001 | FXDP-IM16-0001 | FXDP-OM8-0001 | FXDP-OM16-0001 | FXDP-IOM88-0001 | FXDP-CSG88-0001 | FXDP-XSG16-0001 | Comment                                                            |
|------------------------------------------|---------------|----------------|---------------|----------------|-----------------|-----------------|-----------------|--------------------------------------------------------------------|
| 8 Bit IN                                 | x             |                |               |                |                 |                 | x               | I per connector                                                    |
| 16 Bit IN                                |               | x              |               |                |                 |                 | x               | I/I per connector                                                  |
| 8 Bit OUT                                |               |                | x             |                |                 |                 | x               | O per connector                                                    |
| 16 Bit OUT                               |               |                |               | x              |                 |                 | x               | O/O per connector                                                  |
| 8 Bit IN,<br>8 Bit OUT                   |               |                |               |                | x               |                 | x               | I/I bzw. O/O per<br>connector                                      |
| 8 Bit IN,<br>8 Bit OUT                   |               |                |               |                |                 | x               | x               | I/O per connector                                                  |
| 8 Bit IN,<br>8 Bit DIAG                  |               |                |               |                |                 |                 | x               | I/DIAG per<br>connector                                            |
| 8 Bit OUT,<br>8 Bit DIAG                 |               |                |               |                |                 |                 | x               | O/DIAG per<br>connector                                            |
| 12 Bit IN,<br>4 Bit OUT                  |               |                |               |                |                 |                 | x               | I/I bzw. O/O per<br>connector                                      |
| n Bit IN,<br>16-n Bit OUT<br>(AUTO Mode) |               |                |               |                |                 |                 | x               | outputs are read<br>back                                           |
| n Bit IN,<br>16-n Bit OUT<br>(PROG Mode) |               |                |               |                |                 |                 | x               | channel config-<br>urable as IN,<br>inverted IN,<br>DIAG IN or OUT |
| AddOn:<br>Diag mapped                    | x             | x              | x             | x              | x               | x               | x               | diagnostics mapped<br>to user data area                            |

Parameterization

Table 32:  
Parameter data  
assignment

**A** The parameterization of the input as diagnostic input can only be realized if the input is connected to Pin 2

| Param.-<br>Byte | Parameter                                                                                                                     | Meaning                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| 0 to 6          | Standard DP parameters                                                                                                        | according to PROFIBUS-DP standard                                                           |
| 7 to 9          | Standard DPV1 parameters                                                                                                      | according to PROFIBUS-DP standard                                                           |
| 10              | Channel-parameter [0]<br><b>00</b> = input<br>01 = inverted Input<br>10 = output<br>11 = diagnostic input <b>A</b>            | Channel-function<br>(Channel 0-3)<br>2 Bit define the function of the respective channel.   |
| 11              | Channel-parameter [1]<br><b>00</b> = input<br>01 = inverted Input<br>10 = output<br>11 = diagnostic input <b>A</b>            | Channel-function<br>(Channel 4-7)<br>2 Bit define the function of the respective channel.   |
| 12              | Channel-parameter [2]<br><b>00</b> = input<br>01 = inverted Input<br>10 = output<br>11 = diagnostic input <b>A</b>            | Channel-function<br>(Channel 8-11)<br>2 Bit define the function of the respective channel.  |
| 13              | Channel-parameter [3]<br><b>00</b> = input<br>01 = inverted Input<br>10 = output<br>11 = diagnostic input <b>A</b>            | Channel-function<br>(Channel 12-15)<br>2 Bit define the function of the respective channel. |
| 14              | reserved                                                                                                                      | -                                                                                           |
| 15              | reserved                                                                                                                      | -                                                                                           |
| 16              | U <sub>L</sub> diagnosis<br>00 = diagnosis is not transferred via the bus<br><b>01</b> = diagnosis is transferred via the bus | Activation of U <sub>L</sub> diagnosis                                                      |



Diagnosis

Diagnostic messages in the diagnosis telegram

Table 33:  
diagnostic  
messages

| Diagnostic message   | Meaning                                                                                                                                                                                                                       |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Short circuit        | Channel wise diagnosis for short circuits at the connected sensor/ actuator.                                                                                                                                                  |
| Wire-break           | Indication of a wire-break in the sensor- / or actuator line (please read the following „Note“).<br>The wire-break indication is inverted:<br>diagnostic bit = 0 → no diagnosis<br>diagnostic bit = 1 → wire-break at Diag.IN |
| Undervoltage         | Operation voltage $U_B$ missing or < 18 VDC                                                                                                                                                                                   |
| Load voltage missing | Load voltage $U_L$ missing or < 18 VDC                                                                                                                                                                                        |

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Note

The Pin 2-diagnosis „wire-break“ can only be realized with the module FXDP-XSG-0001 configured as „IM8D8“, „OM8D8“ or „XSG16: 16 IN/ 16 OUT (Prog. Mode)“ (see „Configuration options“, Page 5-7).



Note

A wire-break can only be detected if Pin 1 ( $U_B$  - supply) and Pin 2 are bridged at the sensor or at the actuator.

Diagnosis in the process data image

Table 34:  
process data

| Input    | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
|----------|-------|-------|-------|-------|-------|----------------|----------------|-------|
| Byte 0   | C3P2  | C3P4  | C2P2  | C2P4  | C1P2  | C1P4           | C0P2           | C0P4  |
| Byte 1   | C7P2  | C7P4  | C6P2  | C6P4  | C5P2  | C5P4           | C4P2           | C4P4  |
| Output   | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
| Byte 0   | C3P2  | C3P4  | C2P2  | C2P4  | C1P2  | C1P4           | C0P2           | C0P4  |
| Byte 1   | C7P2  | C7P4  | C6P2  | C6P4  | C5P2  | C5P4           | C4P2           | C4P4  |
| Diagn. A | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2          | Bit 1          | Bit 0 |
| Byte 0   |       |       |       |       |       | U <sub>B</sub> | U <sub>L</sub> | SC    |
| Byte1    | SC 7  | SC 6  | SC 5  | SC 4  | SC 3  | SC 2           | SC 1           | SC 0  |
| Byte2    | SC 15 | SC 14 | SC 13 | SC 12 | SC 11 | SC 10          | SC 9           | SC 8  |
| Byte3    | Con 7 | Con 6 | Con 5 | Con 4 | Con 3 | Con 2          | Con 1          | Con 0 |

**A** Depending on the configuration, the manufacturer specific diagnosis data can be mapped into the user data area.

|                |                                      |
|----------------|--------------------------------------|
| CxPy           | Status: connector x, pin y           |
| SC             | Common short-circuit indication      |
| SCx            | Short-circuit indication channel x   |
| Conx           | Overload sensor voltage: connector x |
| U <sub>B</sub> | U <sub>B</sub> < 18 VDC              |
| U <sub>L</sub> | U <sub>L</sub> <18 VDC               |

## 6 Connection to a Siemens PLC S7

|                                                               |          |
|---------------------------------------------------------------|----------|
| <b>General .....</b>                                          | <b>2</b> |
| <b>Reading- in the GSD File.....</b>                          | <b>3</b> |
| – Reading-in the GSD files before starting the software ..... | 3        |
| – Reading-in the GSD files after starting the software .....  | 3        |
| <b>Selecting the FXDP Modules as Slaves .....</b>             | <b>5</b> |
| Configuring the FXDP modules .....                            | 6        |
| Diagnostic messages in the process image.....                 | 7        |
| <b>Parameterization of the FXDP modules.....</b>              | <b>8</b> |
| <b>Diagnosis evaluation on a S7-PLC .....</b>                 | <b>9</b> |
| Online diagnosis with die SIMATIC Manager .....               | 9        |
| Diagnosis via function block FB125 .....                      | 12       |

## **Connection to a Siemens PLC S7**

### **General**

The software „SIMATIC Manager“ V 5.1 with Service Pack 6 from Siemens is used to configure the connection of FXDP modules with the Siemens S7 PLC.

The CPU used in the S7 in the following example was a CPU 315-2AF02-0AB0 with firmware version 3.

**Reading- in the GSD File**

The GSD files for FXDP must be read into the software before you can begin with the initial configuration. There are two procedures possible for reading-in the files:

**Reading-in the GSD files before starting the software**

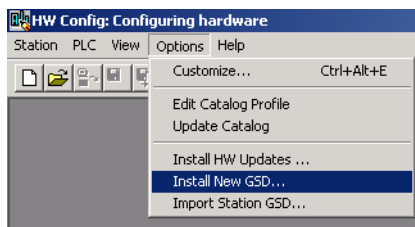
- Copy the GSD files „TUX\_ff1f.gsd“ for the FXDP into the „Step7\S7data\GSD“ directory.
- Copy the icon files (\*.bmp) into the „Step7\S7data“ directory.
- Start the „SIMATIC Manager“ software.
- The FXDP modules will automatically be entered into the hardware overview following correct installation of the files. The hardware overview can be accessed using the <Insert → Hardware Catalog> command.

**Reading-in the GSD files after starting the software**

Proceed as follows to read-in the above GSD files, if you have already started the software.

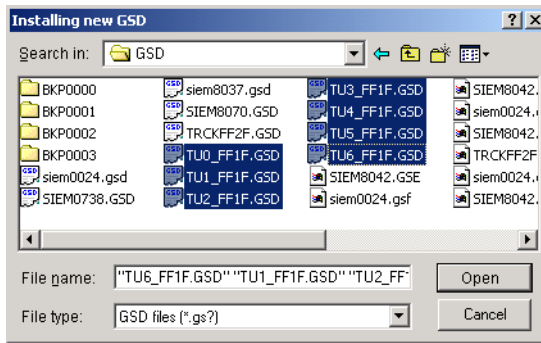
- Create a new or open an existing project.
- Open the hardware configuration software.
- Copy the required GSD file using the <Options □→ Install New \*.GSD...> command.

*Figure 21:  
Reading-in the  
GSD files using  
„Install New  
\*.GSD...“*



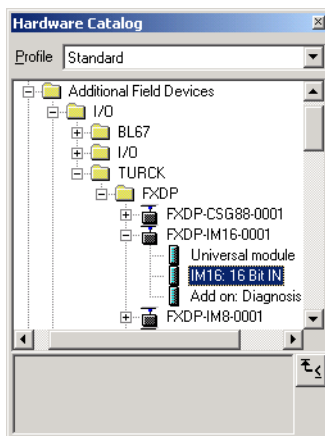
- Select the GSD file from the corresponding source directory.

Figure 22:  
Selection of the  
GSD files from the  
corresponding  
source directory



- The GSD files are listed as separate entries in the hardware catalog following correct installation.

Figure 23:  
FXDP modules in  
the hardware  
catalog



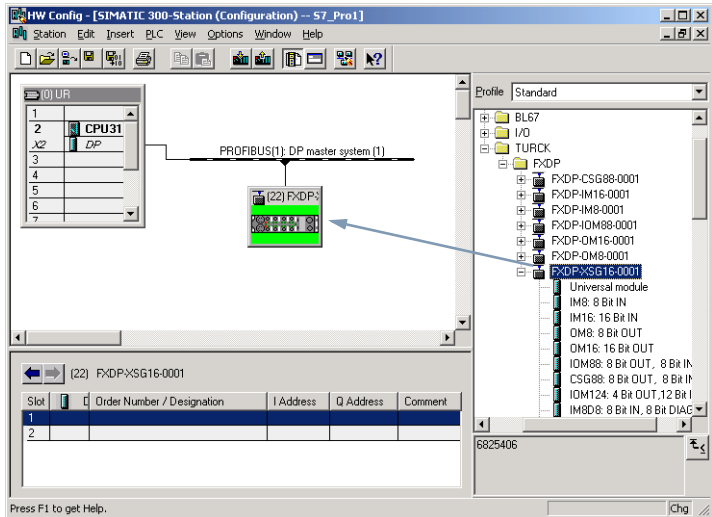
### Note

The exact configuration procedure can be found in the operators manual, which is supplied with the software.

Selecting the FXDP Modules as Slaves

To insert a FXDP module as a slave, select the required entry from the hardware catalog.

Figure 24:  
Inserting a FXDP  
module as a slave

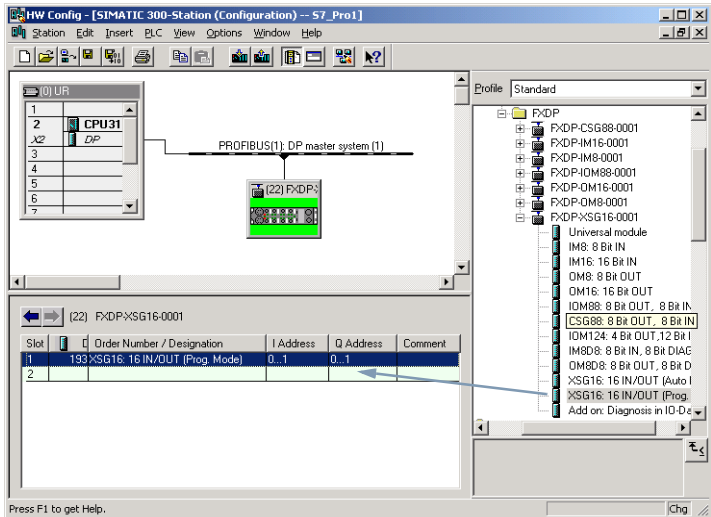


### Configuring the FXDP modules

After the selection of a module as modular slave, the function of the module has to be defined.

Please choose one of the module's configuration options from the hardware catalog.

Figure 25:  
Configuration of  
the slave

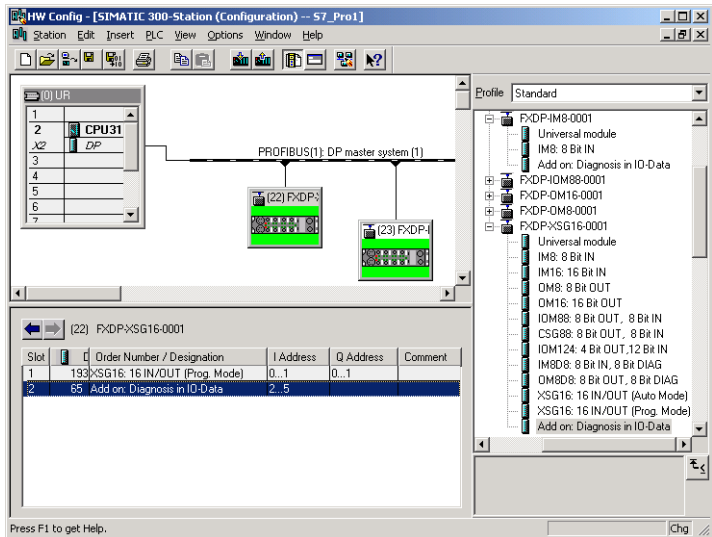


### Diagnostic messages in the process image

The FXDP modules offer the possibility to map the diagnosis data into the process image.

This can be achieved by adding the function „Add On: Diagnosis in I/O-Data“ to the module’s configuration.

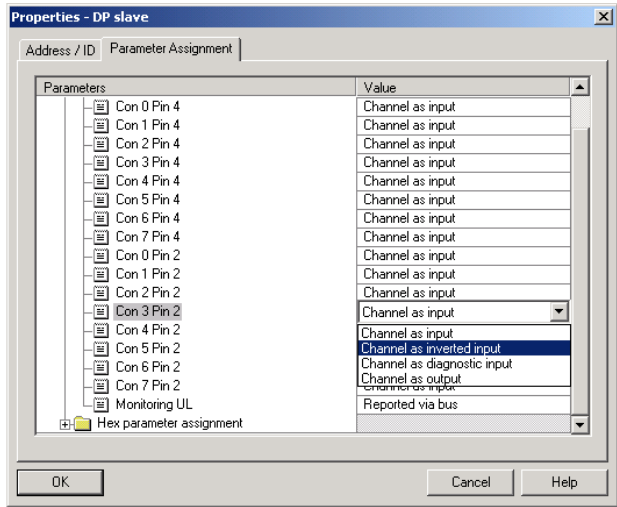
Figure 26:  
Add on: Diagnosis  
in I/O-Data



## Parameterization of the FXDP modules

If parameterizable modules have been chosen, the slave properties can be opened with a double click on the respective module.

Figure 27:  
Parameterizing a  
FXDP module



### Diagnosis evaluation on a S7-PLC

In the following example, a S7 PLC with the CPU 315-2AF02-0AB0, firmware version 3, is used for diagnosis evaluation.



#### Note

A correct diagnosis-data evaluation cannot be guaranteed if S7 PLCs with older hard- or firmware-version are used.

The diagnosis evaluation of the FXDP modules can be done either via the online diagnosis in the hardware configurator of the SIMATIC software or via the Siemens function block FB125. This function block enables the visualization of plain text diagnosis on systems of different manufacturers.

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#### Online diagnosis with die SIMATIC Manager

For the online diagnosis you have to go online with the configured FXDP station in the hardware catalog.

A pending diagnosis is shown in the software with a red symbol at the module image. A double click on the module opens the window „Object properties...“.

The register „DP Slave Diagnostics...“ shows the plain text diagnostic message, the slot number which accords to the connector's number on the FXDP modules and the channel number.



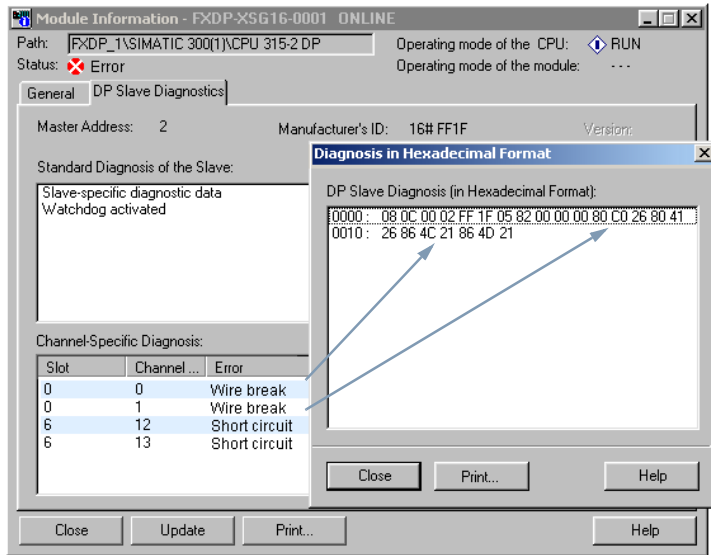
#### Note

The plain text diagnosis is an evaluation of standardized error codes, which are sent by the FXDP modules.

According to the PROFIBUS-DP standard, the meanings of the error codes 1-11 are defined (i.e. 1 = „Short circuit“, 6 = „Wire break“). All other error codes may differ in their interpretation, always depending on the programming software that is used.

The button „Hex Format...” opens the window „Diagnosis in Hexadecimal Format” which shows the module’s entire diagnosis telegram.

Figure 28:  
Module  
information

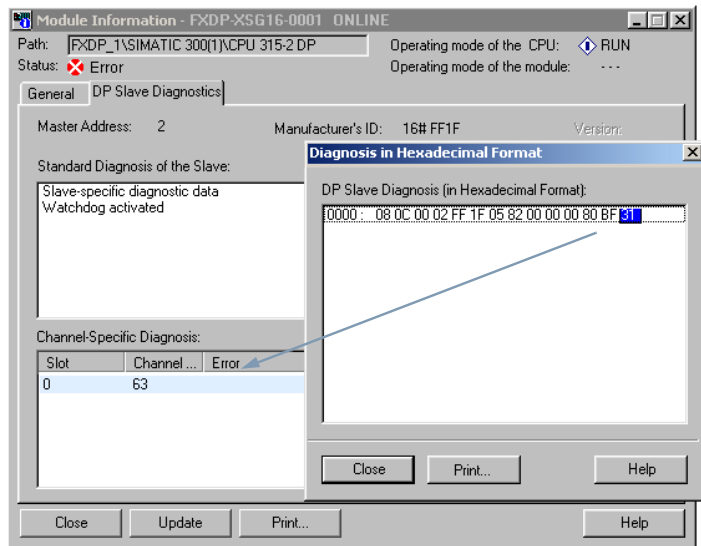


**Note**

The software „SIMATIC Manager“ only interprets the standardized error codes in the online diagnosis.

The following example shows a simulated failure in the load voltage supply ( $U_L$ ). The software can not interpret the diagnostic message „No encoder voltage or load voltage“ (error code 17), because it is not standardized.

Figure 29:  
Error code 17 (not  
standardized)



**Diagnosis via function block FB125**

The following description shows the diagnosis with function block 125 version V4.5. You can download the actual version of the function block directly from the Siemens homepage.

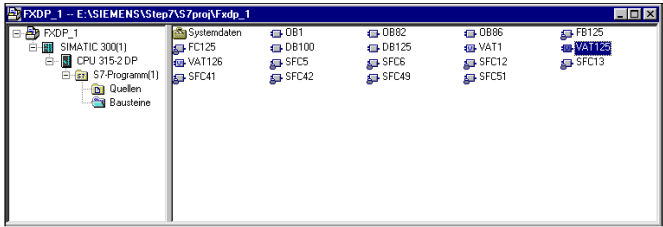


**Note**

Please read the function block's description from Siemens for all information about structure and handling of FB 125.

In order to use the FB125, all „software blocks“ and „symbols“ of the function block have to be copied into the project.

Figure 30:  
Project with  
FB125



Online-access to the modules' diagnostic messages is possible via the variable table VAT125 or the data block DB125.



The following example shows a diagnostic message with error code 6 („Wire break“) at station 22, channel 0.

Figure 31:  
VAT125 with diag-  
nostic message

|    | Operand                           | Symbol                               | Anz | Statuswert                                | Steuerwert |
|----|-----------------------------------|--------------------------------------|-----|-------------------------------------------|------------|
| 2  | E 28.0                            | "MANUAL_MODE"                        | BIN | 2#0                                       |            |
| 3  | E 28.1                            | "SINGLE_STEP_SLAVE"                  | BIN | 2#1                                       | 2#1        |
| 4  | E 28.2                            | "SINGLE_STEP_ERROR"                  | BIN | 2#0                                       |            |
| 5  | E 28.3                            | "RESET"                              | BIN | 2#0                                       |            |
| 6  | E 28.4                            | "SINGLE_SLAVE_DIAG"                  | BIN | 2#0                                       |            |
| 7  | MB 125                            | "SINGLE_DIAG_ADR"                    | DEZ | 30                                        | 30         |
| 8  | M 100.0                           | "ALL_SLAVES_OK"                      | BIN | 2#0                                       |            |
| 9  | MB 102                            | "SUM_SLAVES_DIAG"                    | DEZ | 2                                         |            |
| 10 | MB 103                            | "SLAVE_ADR"                          | DEZ | 22                                        |            |
| 11 | MB 104                            | "SLAVE_STATE"                        | DEZ | 2                                         |            |
| 12 | MW 106                            | "SLAVE_IDENT_NO"                     | HEX | W#16HFF1F                                 |            |
| 13 | MB 108                            | "ERROR_NO"                           | DEZ | 1                                         |            |
| 14 | MB 109                            | "ERROR_TYPE"                         | DEZ | 3                                         |            |
| 15 | MB 110                            | "MODULE_NO"                          | DEZ | 1                                         |            |
| 16 | MB 111                            | "MODULE_STATE"                       | DEZ | 0                                         |            |
| 17 | MB 112                            | "CHANNEL_NO"                         | DEZ | 0                                         |            |
| 18 | MB 113                            | "CHANNEL_TYPE"                       | HEX | B#16H03                                   |            |
| 19 | MW 114                            | "CHANNEL_ERROR_CODE"                 | DEZ | 6                                         |            |
| 20 | //                                | 7.....0_15.....8_23.....16_31.....24 |     |                                           |            |
| 21 | MD 116                            | "CHANNEL_ERROR_INFO_1"               | BIN | 2#0100_0000_0000_0000_0000_0000_0000_0000 |            |
| 22 | MD 120                            | "CHANNEL_ERROR_INFO_2"               | BIN | 2#0000_0000_0000_0000_0000_0000_0000_0000 |            |
| 23 | MB 124                            | "DIAG_COUNTER"                       | DEZ | 0                                         |            |
| 24 | M 100.1                           | "DIAG_OVERFLOW"                      | BIN | 2#0                                       |            |
| 25 | M 100.2                           | "BUSY"                               | BIN | 2#0                                       |            |
| 26 |                                   |                                      |     |                                           |            |
| 27 | //Uebersicht: Ausgefallene Slaves | 6.....1_16.....9_24.....17_32.....25 |     |                                           |            |
| 28 | D8125.DBD 1208                    | "DETAIL_DIAG_DB" FAILED_SLAVES[1]    | BIN | 2#0000_0000_0000_0000_0000_0000_0000_0000 |            |
| 29 | D8125.DBD 1212                    | "DETAIL_DIAG_DB" FAILED_SLAVES[2]    | BIN | 2#0000_0000_0000_0000_0000_0000_0000_0000 |            |
| 30 | D8125.DBD 1216                    | "DETAIL_DIAG_DB" FAILED_SLAVES[3]    | BIN | 2#0000_0000_0000_0000_0000_0000_0000_0000 |            |
| 31 | D8125.DBD 1220                    | "DETAIL_DIAG_DB" FAILED_SLAVES[4]    | BIN | 2#0000_0000_0000_0000_0000_0000_0000_0000 |            |
| 32 | //Uebersicht: Gestoerte Slaves    |                                      |     |                                           |            |
| 33 | D8125.DBD 1224                    | "DETAIL_DIAG_DB" FAULTY_SLAVES[1]    | BIN | 2#0000_0000_0000_0000_0010_0001_0000_0000 |            |
| 34 | D8125.DBD 1228                    | "DETAIL_DIAG_DB" FAULTY_SLAVES[2]    | BIN | 2#0000_0000_0000_0000_0000_0000_0000_0000 |            |
| 35 | D8125.DBD 1232                    | "DETAIL_DIAG_DB" FAULTY_SLAVES[3]    | BIN | 2#0000_0000_0000_0000_0000_0000_0000_0000 |            |
| 36 | D8125.DBD 1236                    | "DETAIL_DIAG_DB" FAULTY_SLAVES[4]    | BIN |                                           |            |

The function block FB125 transmits the diagnostic messages to higher-level operating panels which interpret the error codes and display them as plain text diagnosis.



## **7 Appendix**

## Declaration of conformity

Figure 32:  
Declaration of  
conformity

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| <p><b>Konformitätserklärung</b>      <b>Nr. 3147 M</b><br/> <b>Declaration of Conformity</b></p> <p><small>Diese Konformitätserklärung entspricht der Europäischen Norm EN 45014 "Allgemeine Kriterien für Konformitätserklärungen von Anbietern". Die Grundlage der Kriterien sind internationale Dokumente, insbesondere ISO/IEC Leitfaden 22, 1982: "Information on manufacturer's declaration of conformity with standards or other technical specifications".</small></p> <p><small>This "Declaration of Conformity" complies with the European Standard EN 45014 "General criteria for a supplier's declaration of conformity". These criteria are based on the relevant international documentation, particularly the ISO/IEC Guide 22, 1982: "Information on the manufacturer's declaration of conformity with standards or other technical specifications".</small></p> <p>Wir/ We      <b>HANS TURCK GMBH &amp; CO KG</b><br/> <b>WITZLEBENSTR. 7, D - 45472 MÜLHEIM A.D. RUHR</b></p> <p>erklären in alleiniger Verantwortung, dass die Produkte<br/> declare under our sole responsibility that the products</p> <p><b>Feldbusmodul Typenreihe FXDP...</b></p> <p>auf die sich die Erklärung bezieht, mit den folgenden Normen übereinstimmen<br/> to which this declaration relates are in conformity with the following standards</p> <p><b>EN 61326 / 1998; A1 / 1999</b></p> <p>und wo anwendbar<br/> and where applicable</p> <p><b>EN 50014 / 2000                      EN 50021 / 2000</b></p> <p>Gemäß den Bestimmungen der Richtlinie (falls zutreffend)<br/> Following the provisions of Directive (if applicable)</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 33%;">EMV - Richtlinie</td> <td style="width: 33%;">/ EMC Directive</td> <td style="width: 33%;">89 / 336 / EWG</td> <td style="width: 33%;">3. Mai 1989</td> </tr> <tr> <td>Richtlinie ATEX 100a</td> <td>/ Directive ATEX 100a</td> <td>94 / 9 / EG</td> <td>23. März 1994</td> </tr> </table> <p>Weitere Normen<br/> additional standards</p> <p>Das Feldbusmodul ist unter Berücksichtigung der elektrischen Daten zum Einsatz in Zone 2 geeignet.<br/> Die Ergebnisse der Prüfungen sind in dem Prüfprotokoll 04001H-... festgelegt.<br/> U = 18...30 VDC; I ≤ 200 mA<br/> Der zulässige Umgebungstemperaturbereich ist 0°C ... +55°C.</p> <p><u>Besondere Bedingungen:</u></p> <ul style="list-style-type: none"> <li>- Das Feldbusmodul ist vor vor jeglicher mechanischer Beschädigung und statischer Aufladung zu schützen. Die Module sind aus Netzteilen mit mit sicherer Trennung (IEC60364/UL508) zu versorgen. Die Bemessungsspannung von 30VDC darf auf keinen Fall um mehr als 40% überschritten werden.</li> <li>- Steckverbinder dürfen nicht unter Spannung getrennt werden. Unbenutzte Steckvorrichtungen sind mit einer Schutzkappe zu verschließen.</li> </ul> <p>Das Betriebsmittel erhält folgende Kennzeichnung:  II 3 G    EEx nA IIC T4 X</p> <p>Mülheim, den 06.05.04</p> <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 20px;"> <div style="text-align: center;"> <br/> (i.V. W. Stoll) </div> <div style="text-align: center;"> <small>Name und Unterschrift des Befugten /</small><br/> <small>Name and signature of authorized person</small> </div> </div> <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 20px;"> <div style="text-align: center;"> <small>Ort und Datum der Ausstellung /</small><br/> <small>Place and date of issue</small> </div> </div> | EMV - Richtlinie      | / EMC Directive | 89 / 336 / EWG | 3. Mai 1989 | Richtlinie ATEX 100a | / Directive ATEX 100a | 94 / 9 / EG | 23. März 1994 | <br><small>Industrielle Automation</small> |
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## 8 Glossary

### A

#### **Acknowledge**

Acknowledgment of a signal received.

#### **Active metal component**

Conductor or conducting component that is electrically live during operation.

#### **Address**

Identification number of, e.g. a memory position, a system or a module within a network.

#### **Addressing**

Allocation or setting of an address, e. g. for a module in a network.

#### **Analog**

Infinitely variable value, e. g. voltage. The value of an analog signal can take on any value, within certain limits.

#### **Automation device**

A device connected to a technical process with inputs and outputs for control. Programmable logic controllers (PLC) are a special group of automation devices.

### B

#### **Baud**

Baud is a measure for the transmission speed of data. 1 Baud corresponds to the transmission of one bit per second (Bit/s).

#### **Baud rate**

Unit of measurement for measuring data transmission speeds in Bit/s.

#### **Bidirectional**

Working in both directions.

### **Bus**

Bus system for data exchange, e. g. between CPU, memory and I/O levels. A bus can consist of several parallel cables for data transmission, addressing, control and power supply.

### **Bus cycle time**

Time required for a master to serve all slaves or stations in a bus system, i. e. reading inputs and writing outputs.

### **Bus line**

Smallest unit connected to a bus, consisting of a PLC, a coupling element for modules on the bus and a module.

### **Bus system**

All units which communicate with one another via a bus.

## **C**

### **Capacitive coupling**

Electrical capacitive couplings occur between cables with different potentials. Typical sources of interference are, for example, parallel-routed signal cables, contactors and electrostatic discharges.

### **Coding elements**

Two-piece element for the unambiguous assignment of electronic and base modules.

### **Configuration**

Systematic arrangement of the I/O modules of a station.

### **CPU**

Central Processing Unit. Central unit for electronic data processing, the processing core of the PC.

## **D**

### **Digital**

A value (e. g. a voltage) which can adopt only certain statuses within a finite set, mostly defined as 0 and 1.

### **DIN**

German acronym for German Industrial Standard.

**E****EIA**

Electronic Industries Association – association of electrical companies in the United States.

**Electrical components**

All objects that produce, convert, transmit, distribute or utilize electrical power (e. g. conductors, cable, machines, control devices).

**EMC**

Electromagnetic compatibility – the ability of an electrical part to operate in a specific environment without fault and without exerting a negative influence on its environment.

**EN**

German acronym for European Standard.

**ESD**

Electrostatic Discharge.

**F****Field power supply**

Voltage supply for devices in the field as well as the signal voltage.

**Fieldbus**

Data network on sensor/actuator level. A fieldbus connects the equipment on the field level. Characteristics of a fieldbus are a high transmission security and real-time behavior.

**G****GND**

Abbreviation of ground (potential „0“).

**Ground**

Expression used in electrical engineering to describe an area whose electrical potential is equal to zero at any given point. In neutral grounding devices, the potential is not necessarily zero, and one speaks of the ground reference.

**Ground connection**

One or more components that have a good and direct contact to earth.

### Ground reference

Potential of ground in a neutral grounding device. Unlike earth whose potential is always zero, it may have a potential other than zero.

### GSD

Acronym for Electronic Device Data Sheet which contains standardized PROFIBUS DP station descriptions. They simplify the planning of the DP master and slaves. Default language is English.

## H

### Hexadecimal

System of representing numbers in base 16 with the digits 0 ... 9, and further with the letters A, B, C, D, E and F.

### Hysteresis

A sensor can get caught up at a certain point, and then “waver“ at this position. This condition results in the counter content fluctuating around a given value. Should a reference value be within this fluctuating range, then the relevant output would be turned on and off in rhythm with the fluctuating signal.

## I

### I/O

Input/output.

### Impedance

Total effective resistance that a component or circuit has for an alternating current at a specific frequency.

### Inactive metal components

Conductive components that cannot be touched and are electrically isolated from active metal components by insulation, but can adopt voltage in the event of a fault.

### Inductive coupling

Magnetic inductive couplings occur between two cables through which an electrical current is flowing. The magnetic effect caused by the electrical currents induces an interference voltage. Typical sources of interference are for example, transformers, motors, parallel-routed network and HF signal cables.

**Intelligent modules**

Intelligent modules are modules with an internal memory, able to transmit certain commands (e. g. substitute values and others).

**L****Load value**

Predefined value for the counter module with which the count process begins.

**Lightning protection**

All measures taken to protect a system from damage due to overvoltages caused by lightning strike.

**Low impedance connection**

Connection with a low AC impedance.

**LSB**

Least Significant Bit

**8****M****Mass**

All interconnected inactive components that do not take on a dangerous touch potential in the case of a fault.

**Master**

Station in a bus system that controls the communication between the other stations.

**Master/slave mode**

Mode of operation in which a station acting as a master controls the communication between other stations in a bus system.

**Module bus**

The module bus is the internal bus in a BL20 station. The BL20 modules communicate with the gateway via the module bus which is independent of the fieldbus.

**MSB**

Most Significant Bit

### **Multi-master mode**

Operating mode in which all stations in a system communicate with equal rights via the bus.

### **N**

### **NAMUR**

German acronym for an association concerned with standardizing measurement and control engineering. NAMUR initiators are special versions of the two-wire initiators. NAMUR initiators are characterized by their high immunity to interference and operating reliability, due to their special construction (low internal resistance, few components and compact design).

### **O**

### **Overhead**

System administration time required by the system for each transmission cycle.

### **P**

### **PLC**

Programmable Logic Controller.

### **Potential compensation**

The alignment of electrical levels of electrical components and external conductive components by means of an electrical connection.

### **Potential free**

Galvanic isolation of the reference potentials in I/O modules of the control and load circuits.

### **Potential linked**

Electrical connection of the reference potentials in I/O modules of the control and load circuits.

### **PROFIBUS-DP**

PROFIBUS bus system with DP protocol. DP stands for decentralized periphery. PROFIBUS-DP is based on DIN 19245 Parts 1 + 3 and has been integrated into the European fieldbus standard EN 50170.

It ensures a fast cyclic data exchange between the central DP master and the decentralized periphery devices (slaves). Its universal use is realized by the multi master concept.

**PROFIBUS-DP address**

Each PROFIBUS-DP module is assigned an explicit PROFIBUS-DP address, with which it can be queried by the master.

**PROFIBUS-DP master**

The PROFIBUS-DP master is the central station on the bus and controls access of all stations to PROFIBUS.

**PROFIBUS-DP slave**

PROFIBUS-DP slaves are queried by the PROFIBUS-DP master and exchange data with the master on request.

**Protective earth**

Electrical conductor for protection against dangerous shock currents. Generally represented by PE (protective earth).

8

**R****Radiation coupling**

A radiation coupling appears when an electromagnetic wave hits a conductive structure. Voltages and currents are induced by the collision. Typical sources of interference are for example, sparking gaps (spark plugs, commutators from electric motors) and transmitters (e. g. radio), that are operated near to conducting structures.

**Reaction time**

The time required in a bus system between a reading operation being sent and the receipt of an answer. It is the time required by an input module to change a signal at its input until the signal is sent to the bus system.

**Reference potential**

Potential from which all voltages of connected circuits are viewed and/or measured.

**Repeater**

The phase and the amplitude of the electric data signals are regenerated during the transmission process by the repeater.

Further, it is possible to change the topology of the PROFIBUS network. It can be extended considerably by means of the repeater.

### **Root-connecting**

Creating a new potential group using a power distribution module. This allows sensors and loads to be supplied individually.

### **RS 485**

Serial interface in accordance with EIA standards, for fast data transmission via multiple transmitters.

## **S**

### **Serial**

Type of information transmission, by which data is transmitted bit by bit via a cable.

### **Setting parameters**

Setting parameters of individual stations on the bus and their modules in the configuration software of the master.

### **Shield**

Conductive screen of cables, enclosures and cabinets.

### **Shielding**

Description of all measures and devices used to join installation components to the shield.

### **Short-circuit proof**

Characteristic of electrical components. A short-circuit proof part withstands thermal and dynamic loads which can occur at its place of installation due to a short circuit.

### **Station**

A functional unit or I/O components consisting of a number of elements.

### **SUB-D connector**

9-pin connector for connecting the fieldbus to the I/O-stations.

## **T**

### **Terminating resistance**

Resistor on both ends of a bus cable used to prevent interfering signal reflections and which provides bus cable matching. Terminating resistors must always be the last component at the end of a bus segment.

**To ground**

Connection of a conductive component with the grounding connection via a grounding installation.

**Topology**

Geometrical structure of a network or the circuitry arrangement.

**U****UART**

Universal Asynchronous Receiver/Transmitter. UART is a logic circuit which is used to convert an asynchronous serial data sequence to a parallel bit sequence or vice versa.

**Unidirectional**

Working in one direction.



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