

SIMATIC

Bus links

Active field distributor AFDiS

Product Information

Product Information

1.1 Introduction

This product information contains important information on the active field distributor AFDiS, order number 6ES7157-0AG83-0XA0. It should take priority over information provided in manuals and catalogs if conflicts occur.

In addition to this product information, you need the associated manual, "Bus links DP/PA coupler, active field distributor, DP/PA Link and Y Link". It is available for download from the Internet (<http://support.automation.siemens.com/WW/view/en/1142696>).

Setting the dimensions of plants

When setting the dimensions of plants with active field distributors, use the "SIMATIC Fieldbus Calculator". It is available for download from the Internet (<http://support.automation.siemens.com/WW/view/en/53842953>) Internet.

Commissioning plants with active field distributors

Note

Bus system failure

If an error occurs, the bus system may fail completely or partially.

Before you commission a plant with ring redundancy, check the function of the plant by means of a line interruption/short circuit or by opening the IP30 covers on each AFDiS and on each AFD (opening the IP30 covers is also interpreted as an error).

Note

Design

Ring redundancy has been tested and approved for use with Siemens network components.

3.6 Connecting PROFIBUS PA to the AFDiS

Introduction

The PROFIBUS PA cables are introduced into the enclosure by means of cable glands.

- The PA main line via T1 and T2.
- The spur lines to the field devices via S1 to S6

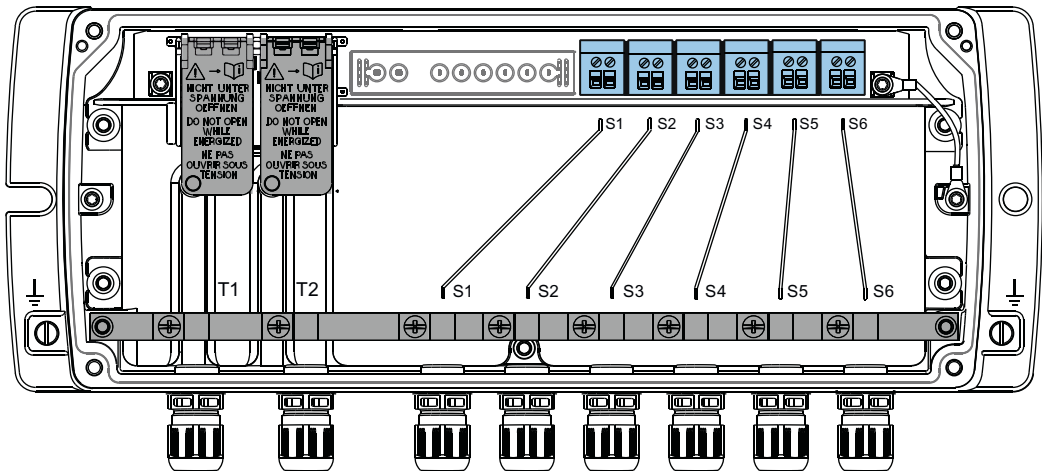


Figure 3-4 Internal view of AFDiS

Pin assignment

Connect the wiring of the PROFIBUS PA cable to the terminal block in the active field distributor via the screw-type terminals.

Table 3- 3 Pin assignment on the active field distributor AFDiS

T1+ T1-	T2+ T2-	S1+ S1-	S2+ S2-	S3+ S3-	S4+ S4-	S5+ S5-	S6+ S6-

Connection		Terminal	Assignment
T1, T2	Main line	+	Data cable (red)
		-	Data cable (green)
S1 ¹ to S6	Spur line to the field devices	+	Data cable (red)
		-	Data cable (green)
Shield / bar		Direct grounding for T1/T2; S1 to S6	

¹ S1 optionally for a subsegment with a length of up to 500 m or for a spur line; line termination with bus terminating resistor

Basic procedure

1. Prepare PROFIBUS PA cable.
2. Connect the PROFIBUS PA cable:
 - Open the field distributor.
 - Connect the spur lines and PA main lines to the terminal block.
3. Close field distributor

Requirement

- Active field distributor is mounted.

Note

Before connecting the PROFIBUS PA, read the chapter "Safety instructions for connection"!

Tools required

- Phillips screwdriver, size 4
- Open ring spanner 19 mm
- Screwdriver 3 mm
- Small knife, end-cutting nipper or FC stripping tool

Required accessories

- PROFIBUS PA cable (cable type A)
- Sealing plugs for unused connections

Stripping dimensions for PROFIBUS PA cable

For secure connection of the wires in the screw-type terminals, observe the following stripping dimensions of the PA cables for the main lines and spur lines.

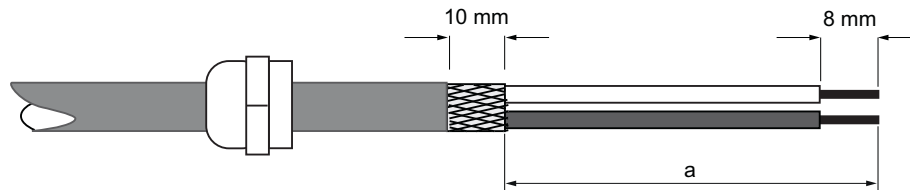
Table 3- 4 Stripping dimensions for PA cable

Type of grounding	Length of stripping	Main line T1, T2	Spur lines S1 to S3	Spur lines S4 to S6
Direct grounding	a	105 mm	120 mm	105 mm

3.6 Connecting PROFIBUS PA to the AFDiS

Direct grounding: Prepare PROFIBUS PA cable

1. Remove the union nut of the cable gland of the AFDiS using the ring spanner.
2. Thread the union nut onto the unprepared- PA cable.
3. Strip the PA cable as shown in the figure.



Direct grounding: Connect the PROFIBUS PA cable to S1 to S6

1. Open the field distributor: Remove the 4 screws of the enclosure cover using a Phillips screwdriver.
2. Insert the cable under the shield clamp and tighten the screw.
3. Connect the wires to the terminal block in accordance with the pin assignment.
Torque 0.35 Nm.
4. Tighten the union nut of the cable gland. Torque 1.3 Nm.

Direct grounding: Connect the PROFIBUS PA cable to T1/T2

WARNING

Hazardous area - Zone 1

Under no circumstances connect the PA main line to the AFDiS during operation.
Before connecting the PROFIBUS PA to the AFDiS, disconnect all the supply voltages of the bus segment!

1. Route the cable for the main line through the cable gland T1/T2 under the shield clamp and tighten the screw.
2. Open the IP30 cover T1/T2.
3. Connect the wires to the terminal block T1/T2 in accordance with the pin assignment.
4. Close the IP30 covers until you hear them engage.
5. Tighten the union nut of the cable gland. Torque 1.3 Nm.

NOTICE

Impairment of the degree of protection

The degree of protection can be impaired if you overtighten the union nut.

Close field distributor

1. Place the enclosure cover on the enclosure base and tighten the 4 screws. Torque 2.4 Nm.

NOTICE**Impairment of the degree of protection**

The degree of protection IP66 will not be guaranteed if connections are not used.

Close unused connections with a **sealing cap**. The union nuts with the yellow dust protection caps are not sufficient protection.

See also

Grounding (Page 44)

Connecting the PROFIBUS PA to the active field distributor (AFD) (Page 95)

Components of the bus links (Page 245)

3.7 Grounding AFDiS**Required accessories**

- Grounding cable, at least 4.0 mm²

Grounding the active field distributor AFDiS

1. Strip the insulation of the grounding cable to 8 mm.
2. Fasten the grounding cable to the right-hand or left-hand grounding terminal of the AFDiS.

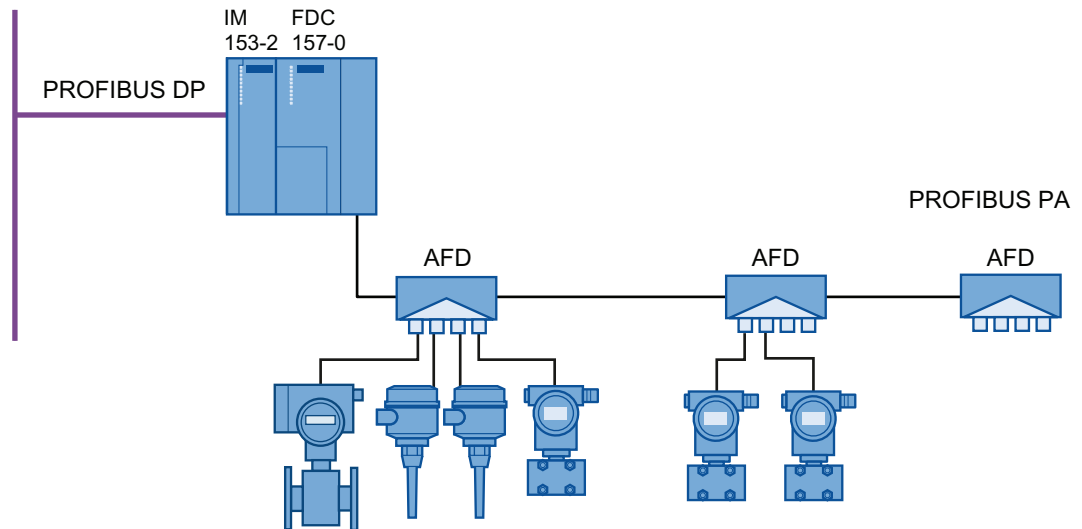
**DANGER****Active field distributor AFDiS**

Connect the grounding cable with the equipotential bonding EB in accordance with EN 60079-14.

See also

Grounding the active field distributor AFD / AFS (Page 90)

DP/PA coupler in the DP/PA link



4.1.3 DP/PA coupler in redundancy mode

4.1.3.1 Ring redundancy with active field distributor (AFD)

Ring redundancy

The use of a DP/PA coupler pair and of active field distributors increases the availability of the equipotential bonding line. Ring redundancy is created by configuring a ring structure with 2 FDC-157-0 DP/PA couplers and field distributors:

- Up to 8 field distributors when exclusively using AFD
- Up to 5 field distributor with mixed use of AFD and AFDiS

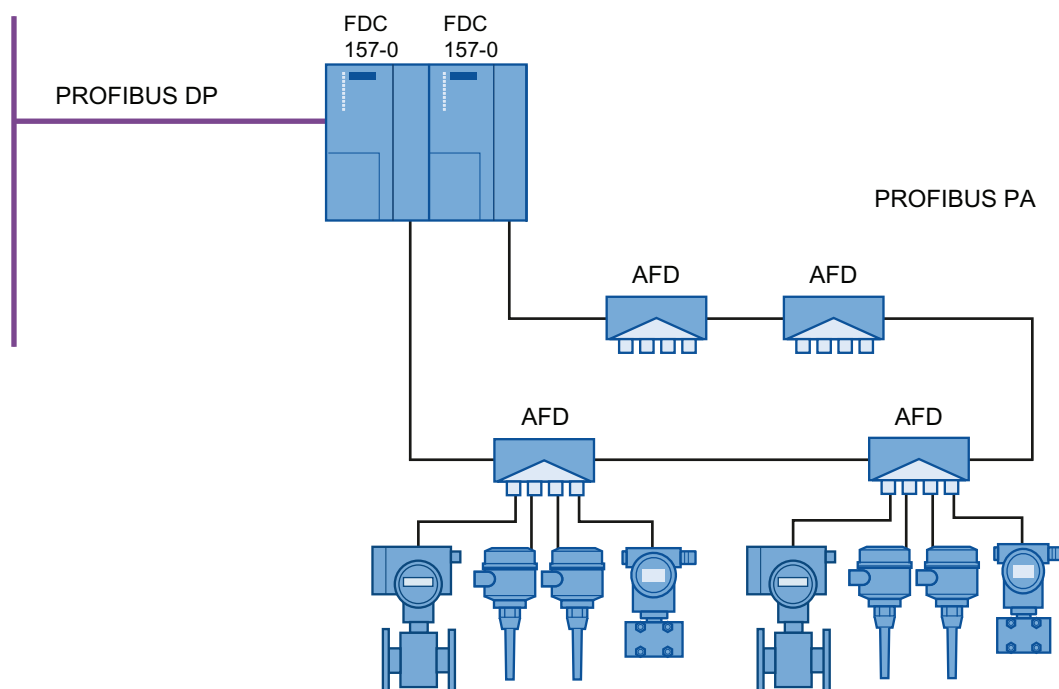
The active DP/PA coupler FDC 157-0 supplies the equipotential bonding line. In the event of short-circuit or wire break on the PA main line the active DP/PA coupler supplies the cut equipotential bonding line in both directions. PA field device function remains intact. Repairs can be executed during operation.

NOTICE

Power supply

To ensure availability in redundancy mode we recommend using an autonomous power supply module for each DP/PA coupler.

Installation with ring redundancy



Ring redundancy: Component behavior in the event of errors

Table 4- 2 Ring redundancy: Component behavior in the event of errors

Components	DP/PA coupler pair	Active field distributors	PA field devices	equipotential bonding line
Error				
Failure of the energizing DP/PA coupler	• Switchover to partner coupler. • Partner coupler takes over the power supply of the equipotential bonding line.	O. K.	O. K.	O. K.
Short circuit or wire break on the PA main line	• The active energizing DP/PA coupler supplies the cut equipotential bonding line in both directions. • The partner coupler is active conducting.	Insulate, and terminate adjacent AFD / ADFiS.	O. K.	Equipotential bonding line is cut but is still supplied.
Short-circuit on the spur line	O. K.	• Current limit of the AFD / AFDiS is active. • Field distributor reports failure on the AFD spur line: green LED flashes, AFDiS: blue LED flashes	• Non-participating field devices remain O.K. • Field device on the affected spur line fails.	O. K.

See also

Connections for ring redundancy (Page 94)

13.1.7 LED displays of the active field distributor AFDiS

Status and field messages from the active field distributor AFDiS

Table 13- 7 Status and field messages from the active field distributor AFDiS

T1

T2

S1

S2

S3

S4

S5

S6

LED T1, T2	LED S1 to S6	Meaning	Remedy
green		PA main line connected. Bus terminator inactive.	-
orange		Automatic bus terminator active. Cause: - For example, last AFD or AFDiS in the line - Short-circuit or no-load operation on the respective segment of the PA main line (T1 or T2)	-
Flashes orange		IP30 cover of the main line terminal is open.	Close the IP30 cover until you hear it engage.
Off		Wires of a PA main line swapped	Correct the wiring.
	Off	No field device is connected to the respective spur line.	-
	blue	Field device is connected.	-
	Flashes slowly	Short-circuit on the PA spur line	Eliminate the cause of the error.
	Flashes rapidly	Debounce function is active (3 s after changes to the spur lines, e.g. before or after a short-circuit)	wait for 3 s. One of the statuses "off", "blue" or "slow flashing" arises.

14.8 Technical specifications of active field distributor AFDiS (6ES7157-0AG83-0XA0)

Technical specifications	
Order number	6ES7157-0AG83-0XA0
Product version	01
Dimensions and weight	
Dimension W x H x D (mm)	380 x 85 x 170
Weight	4500 g
Supply voltages	
Description	Via bus; no auxiliary power necessary
Nominal value	
• Lower limit of permissible range (DC)	16 V
• Upper limit of permissible range (DC)	32 V
• Polarity reversal protection (only in connection with DP/PA coupler)	Yes; up to 1 A
• Overvoltage protection	No
Current consumption/power loss	
Power consumption	
• At 28 V input voltage	$\leq 64 \text{ mA} + (0.838 * \text{aggregate current of all the field devices})$
• At 24 V input voltage	$\leq 67 \text{ mA} + (1.008 * \text{aggregate current of all the field devices})$
• At 20 V input voltage	$\leq 74 \text{ mA} + (1.246 * \text{aggregate current of all the field devices})$
Short-circuit at all the spur lines	
• At 28 V input voltage	92 mA
• At 24 V input voltage	100 mA
• At 20 V input voltage	110 mA
Power loss, min.	1.4 W
Power loss, max.	5.9 W
Interfaces	
PROFIBUS DP	No
PROFIBUS PA	Yes
FOUNDATION Fieldbus H1	Yes

14.8 Technical specifications of active field distributor AFDiS (6ES7157-0AG83-0XA0)

Connections	
Main cables	
Number	2
Terminals (internal)	Screw-type terminals (3-pin)
Cable gland (enclosure)	M16
Cable type	Type A
• Min. cable diameter	4 mm
• Max. cable diameter	9 mm
• Min. conductor cross-section	0.2 mm ²
• Max. conductor cross-section	2.5 mm ²
Automatic bus terminator	Yes
Spur cables	
Number n	6
Connecting terminals	Screw-type terminals (3-pin)
Cable gland	M16
Cable type	Type A
• Min. cable diameter	4 mm
• Max. cable diameter	9 mm
• Min. conductor cross-section	0.2 mm ²
• Max. conductor cross-section	2.5 mm ²
Short-circuit-proof	Yes
Intrinsically-safe acc. to FISCO	Yes
Max. DC current of the field devices spur line 1	60 mA
Max. DC current of the field devices spur line 2 to 6	40 mA
Max. DC total current of all the field devices	180 mA
Short-circuit current (test current)	5 mA
Debounce logic	Yes
Max. no-load voltage	15.3 V
Max. current output to field devices	260 mA
Grounding	
Direct grounding	Via connection bar
Interrupts, diagnostics, status information	
Status display	Yes
Interrupts	None
Diagnostics function	Yes
Diagnostic indicator LED	Yes
Data transfer	
Between main line and spur lines	Repeater function
Electrical isolation	
Between main line and spur lines	Yes
Test voltage	2550 VDC 2s

14.8 Technical specifications of active field distributor AFDiS (6ES7157-0AG83-0XA0)

Environmental requirements	
Operating temperature	
• min.	-40 °C
• max.	70 °C
Storage/transport temperatures	
• min.	-40 °C
• max.	85 °C
Relative humidity	
Operation, max.	95%
Degree of protection	IP66
Installation	
Zone 2 / Zone 22	Yes
Zone 1 / Zone 21	Yes
Class I Zone 2 / Division 2	Yes
Class I Zone 1	Yes