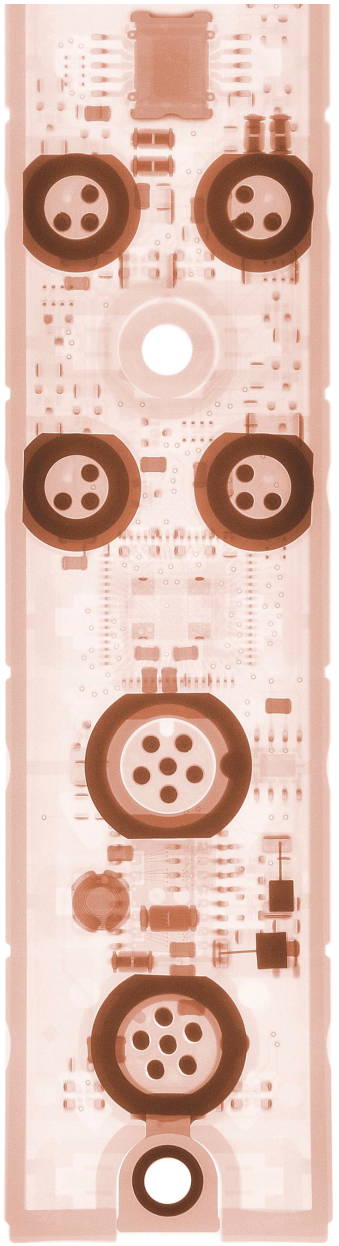
TECHNICAL MANUAL FOR **FD67 MODULES**



NORGREN

ISSUE 1

Table of contents

1 Concerning this manual

Please be sure to read this Users' Manual prior to starting up the equipment. The manual must be stored in a conspicuous location so as to be accessible to all users at all times.

User's manuals for modules of the FD67 series :

- FD67 System handbook,
- FD67 Bus system handbook — Profibus, DeviceNet
- FD67 Technical manual

The text, illustrations, diagrams and examples presented in this manual serve solely for the purpose of explanation, operation and use of Input/Output modules of the FD67 series.

If you should have any further reaching questions regarding the installation and set-up of the equipment described in this manual, please don't hesitate to contact us. We would be glad to assist you any time.

Internet: http://www.norgren.com

Norgren reserves the right to change technical specifications or contents of this manual at any time without notice.

1.1 Chapter overview

The „Installation" section contains comprehensive mechanical and dimensional information relevant to successful mounting of the FD67 system. It is directed specifically towards electricians who are responsible for the assembly and installation of system components.

The „Connection " and „Installation" sections contain comprehensive electrical and dimensional information relevant to successful mounting of the FD67 system. It is directed specifically towards electricians who are responsible for the assembly and installation of system components.

The „Technical data" section is directed towards system planners and provides all the technical data of the FD67 series.

1.2 Explanation of symbols and safety instructions

Please observe all the safety instructions mentioned in this manual. Chapter 2 of the FD67 System manual must be read without fail prior to working with the FD67 systems.

The symbols used in this manual are explained in the FD67 System manual, Chapter 2.3.

2 Installation

2.1 Mounting instructions

2.1.1 Support and positioning

The modules of the FD67 series can be attached directly to an installation panel or a machine. Two mounting holes are provided for this purpose. DIN rail mounting kits are also available as accessories.

Before attaching the module, it must be assured that the mounting surface is smooth and flat to prevent mechanical stress in the module housing.

There are no restrictions regarding the module positioning.

2.1.2 Number of components

- Max. 16 expander modules per bus node.
- Up to 4 expander modules are admissible on each of the 4 bus node connections.

2.1.3 Spacing

- To ensure correct installation of the system components, it is advisable to observe the recommended min. spacing when assembling modules. See Table 2-1: Min. spacing between modules.
- The max. extension of a branch is 5 m.

Fig. 2-1: Min. spacing

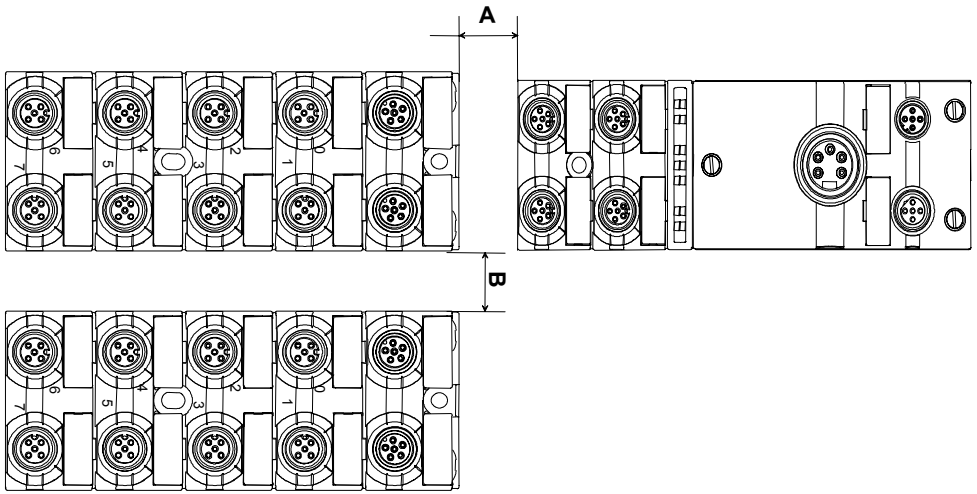


Table 2-1: Min. spacing between modules

Min. spacing	A	B
Straight connector	3 mm	3 mm
90° connector	50 mm	50 mm

2 Installation

2.1.4 Module dimensions

Table 2-2: Module dimensions

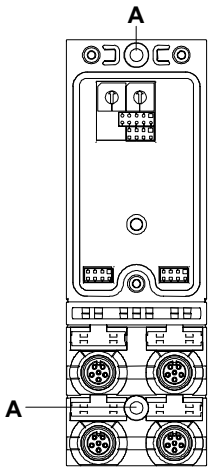
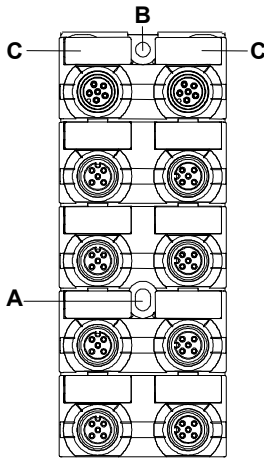
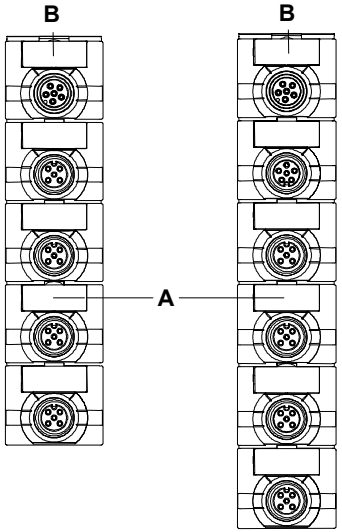
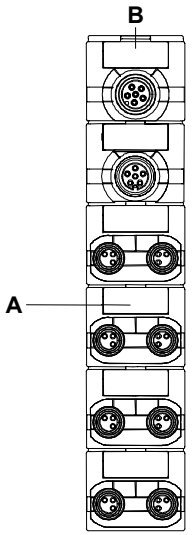
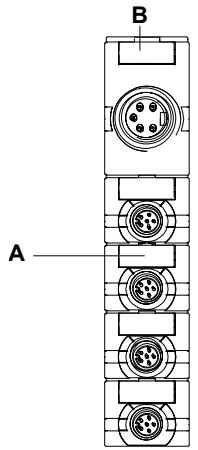
Part No.	Description	Height [mm]	Width [mm]	Depth[1] [mm]
FD67NDPM127804	Profibus-DP node	151	50	51
FD67NDNM127804	Devicenet node	151	50	51
FD67DIOM121216	16 Outputs/Inputs with external power	126	30	35
FD67DIOM120016	16 Outputs/Inputs (8 x M12)	126	50	35
FD67DIM120016	16 Inputs (8 x M12)	126	50	35
FD67DIOM120008	8 Outputs/Inputs (4 x M12)	151	30	35
FD67DIM120008	8 Inputs (4 x M12)	151	30	35
FD67DIOM080008	8 Outputs/Inputs (8 x M8)	151	30	35
FD67DIM080008	8 Inputs (8 x M8)	151	30	35
FD67AICM120004	Analogue Input Current (4 x M12)	126	30	35
FD67AIVM120004	Analogue Input Voltage (4 x M12)	126	30	35
FD67AOCM120004	Analogue Output Current (4 x M12)	126	30	35
FD67AOVM120004	Analogue Output Voltage (4 x M12)	126	30	35
FD67PDM127804	Power distribution module	126	30	35
FD67DODSC0016	16 Outputs D-sub connector	151	30	35

You can find the dimension drawings in the technical data sheets

1 - The mounting depth is given without connected cables. Therefore the bending radius of conductors must be considered.

2 Installation

Table 2-3: Module mounting holes

Bottom section of the bus node	8xM12 modules	4xM12 modules	8xM8 modules	Power distributor 4xM12
FD67NDPM127804, FD67NDNM127804	FD67DIM120016, FD67DIOM120016	FD67DIM120008, FD67DIOM120008, FD67AICM120004, FD67AIVM120004, FD67AOCM120004, FD67AOVM120004	FD67DIM080008, FD67DIOM080008	FD67PDM127804
				
A. Mounting hole	A. Mounting hole under the label plate B. Mounting hole and functional ground C. Additional mounting hole (optional)	A. Mounting hole under the label plate B. Mounting hole and functional ground	A. Mounting hole under the label plate B. Mounting hole and functional ground	A. Mounting hole B. Mounting hole and functional ground

2 Installation

2.2 Mounting the bus node

Initial conditions

- Smooth and flat mounting surface.
- The system is dead (cut off).

Mounting material

- 2 fastening screws 4 mm in diameter.
- 2 DIN 433 T1/T2 lock washers.

Tools

- Screwdriver, middle-sized
- Mounting drawing, see Fig. 2-2: Assembling the hood of the bus node

a) Mounting the base module of the bus node

Attach the module to the mounting holes by means of the 2 fastening screws 4 mm in diameter (see Table 2-3: Module mounting holes). The tightening torque is 2 Nm.

The hood must be screwed onto the base module and all the connectors must be fitted with cables or blind caps in compliance with type IP 67 specifications

b) Setting the field bus address and baud rate

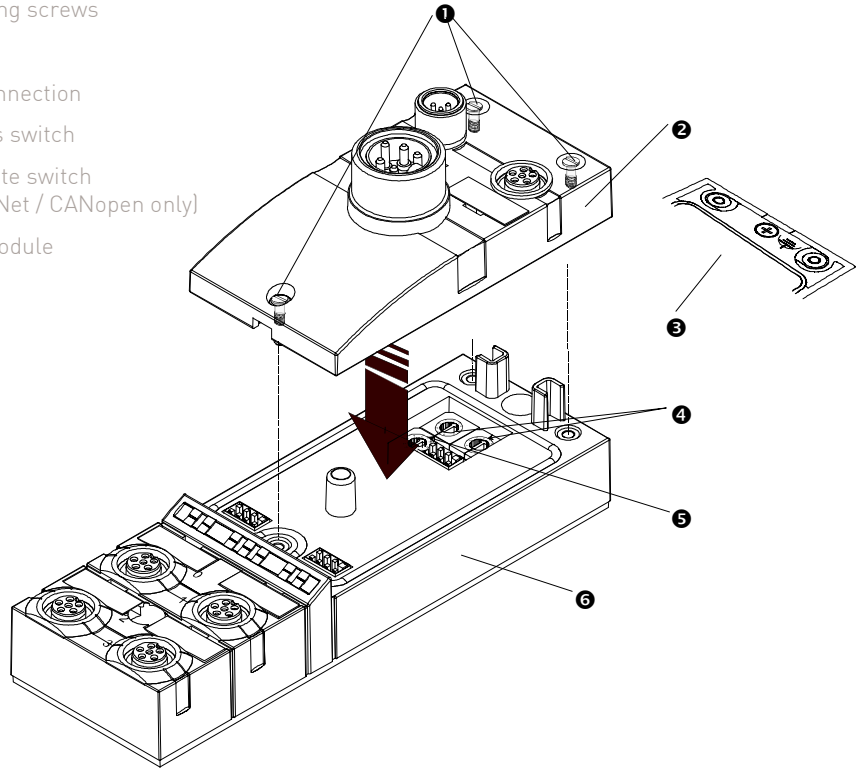
Two address switches are provided to set the bus node address in the field bus system. For more information, refer to the User's manual of your field bus system.

c) Assembling the hood of the bus node

Before assembling the hood, it is advisable to set the field bus address and the appropriate baud rate, because the switches are no longer accessible when the hood is attached. It is also recommended to note the field bus address on a label plate.

Fig. 2-2: Assembling the hood of the bus node

❶ Fastening screws
❷ Hood
❸ FE² -connection
❹ Address switch
❺ Baud rate switch (DeviceNet / CANopen only)
❻ Base module



Step by step:

① Connect the FE conductor to the base ❸ of the hood ❷.

② Mount the hood ❷ on the base module. Take care not to tilt the hood.

③ The hood is fastened by three captive screws ❶ integrated in the hood. Tighten the screws. The tightening torque is 1,0 Nm.

2 Installation

2.3 Mounting I/O modules

Initial conditions

- Smooth and flat mounting surface
- Up to 16 modules per bus node
- Up to 4 modules on each of the 4 bus node connections
- The system is dead (cut off)

Mounting material

- 2 fastening screws 4 mm in diameter.
- 2 DIN 433 T1/T2 lock washers.

Tools

- Screwdriver, middle-sized

a) Mounting the module

① The mounting holes (see Table 2-3) are partly located under the label plates. In this case, they must be removed by using a screwdriver.

The location of the different mounting holes is shown in the table on page 6.

Removing a label plate
Set the screwdriver slantwise into the little opening of the label plate. The latter can be easily removed by a slight lever movement.

② Attach the cable connected to the functional ground to the mounting hole B. Use a cable shoe and a locking ring on the module side to assure an appropriate connection between the functional ground and the module. This link must be kept as short as possible, in conformity with EMC specifications.

③ Attach the module to the mounting holes by means of the 2 fastening screws 4 mm in diameter (tightening torque: 2 Nm).

Some modules have more than 2 mounting holes. Preferably use the mounting holes A or B. The mounting holes C can also be used to increase mechanical stability, particularly in environments subjected to vibrations.

④ Snap the previously removed label plates into the dedicated notches on the module.

2 Installation

2.4 Connections

2.4.1 Bus node

2.4.1.1 Connections of the FD67NDPM127804

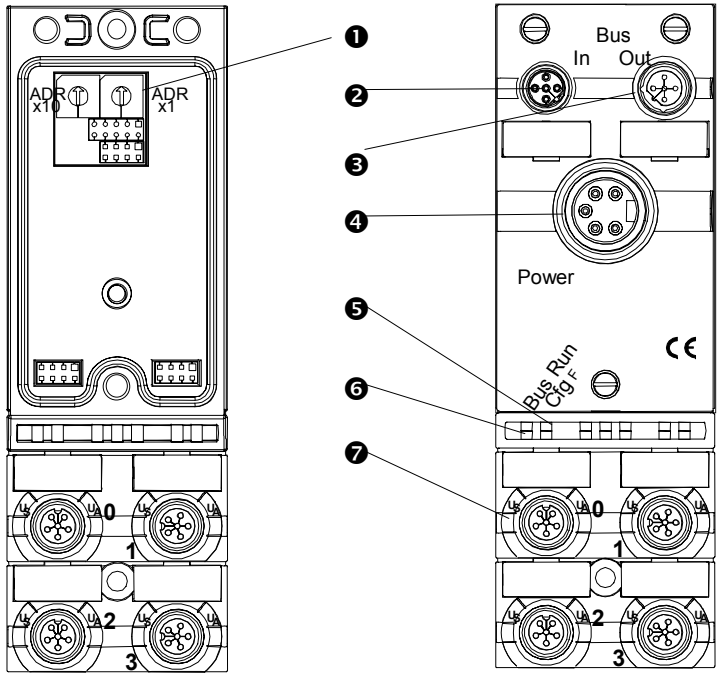


Fig. 2-3: Connections of the FD67NDPM127804 module

1. Address switch for setting the Profibus subscriber address
2. Bus In (incoming Profibus connection)
3. Bus Out (outgoing Profibus connection)
4. Power supply connection
5. Cfg F LED (display of Profibus configuration error)
6. Bus Run LED (display of Profibus status)
7. Connection for the internal system connection sockets 0 to 3

2.4.1.2 Connections of the FD67NDNM127804

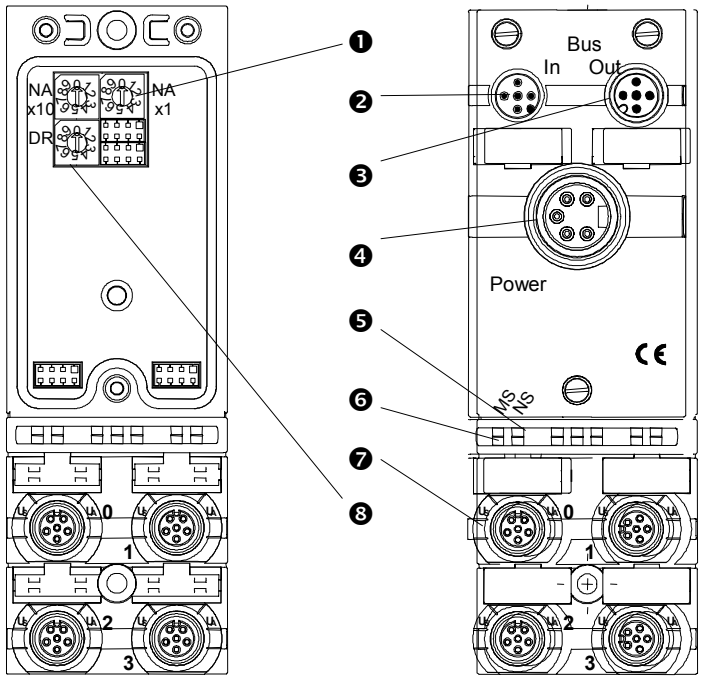


Fig. 2-4 : Connections of the FD67NDNM127804 module

1. Address switch for setting the DeviceNet subscriber address
2. Bus In (incoming DeviceNet connection)
3. Bus Out (outgoing DeviceNet connection)
4. Power supply connection
5. NS LED (display of Network Status)
6. MS LED (display of Module Status)
7. Connection for the internal system connection sockets 0 to 3
8. Switch for setting the DeviceNet baud rate

2 Installation

2.4.2 I/O modules

2.4.2.1 Connections of the FD67DIOM121216 module

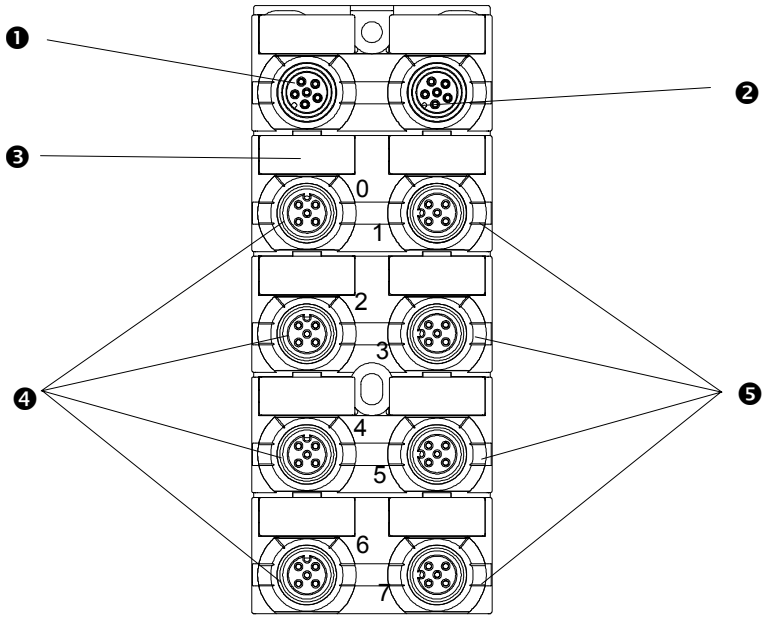


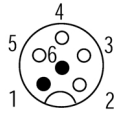
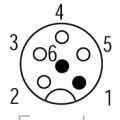
Fig. 2-5: Connections of the FD67DIOM121216

❶ Connection for the internal system connection
❷ Connection for the external actuator supply
❸ Label plate
❹ M12 socket for sensors or actuators (internal actuator supply)
❺ M12 socket for sensors or actuators (external actuator supply)

2.4.2.2 External actuator supply

The parameterised outputs are supplied via the external actuator supply at the odd-numbered sockets 1, 3, 5 and 7 (channels 01, 03, 05, 07, 11, 13, 15, 17). The external actuator supply must be connected if outputs are to be used on these channels.

Fig. 2-6: Pin assignments of external actuator supply

Assignments	Contact	Signification
 Male	1	Actuator supply + 24 V DC
	6	Ground
 Female	1	Actuator supply + 24 V DC
	6	Ground

2 Installation

2.4.2.3 Connections of the FD67DIOM120016 module

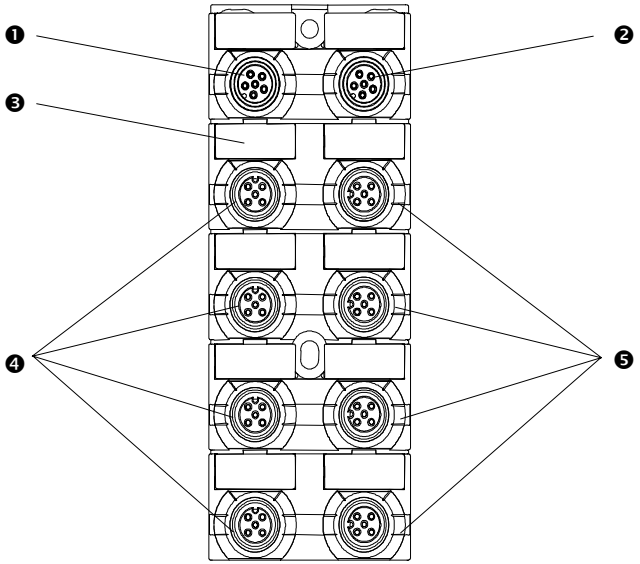


Fig. 2-7: Connections of the FD67DIOM120016

❶ Connection for the internal system connection (incoming)
❷ Connection for the internal system connection (outgoing)
❸ Label plate
❹ M12 socket for sensors or actuators (internal actuator supply)
❺ M12 socket for sensors or actuators (internal actuator supply)

2.4.2.4 Connections of the FD67DIM120016 module

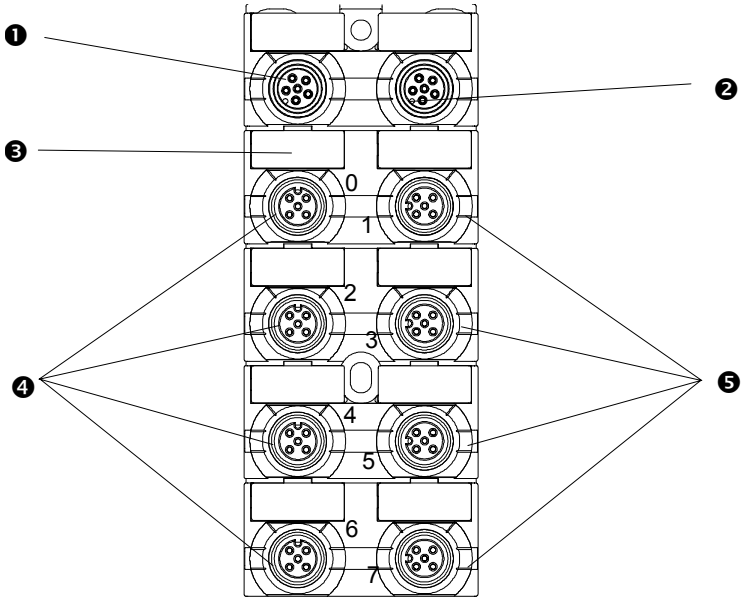


Fig. 2-8: Connections of the FD67DIM120016

❶ Connection for the internal system connection (incoming)
❷ Connection for the internal system connection (outgoing)
❸ Label plate
❹ M12 socket for sensors (even-numbered sockets)
❺ M12 socket for sensors (odd-numbered sockets)

2 Installation

2.4.2.5 Connections of the FD67DIOM120008 module

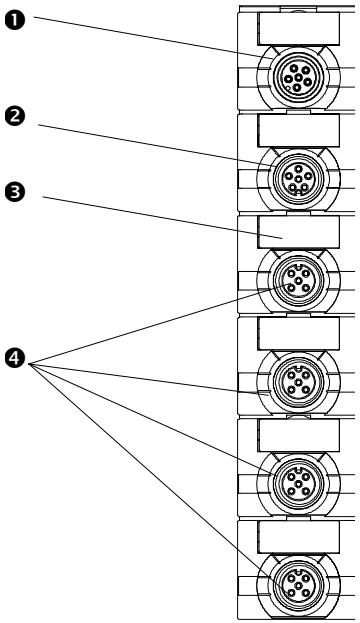


Fig. 2-9 : Connections of the FD67DIOM120008

❶ Connection for the internal system connection (incoming)
❷ Connection for the internal system connection (outgoing)
❸ Label plate
❹ M12 socket for sensors or actuators (internal actuator supply)

2.4.2.6 Connections of the FD67DIM120008

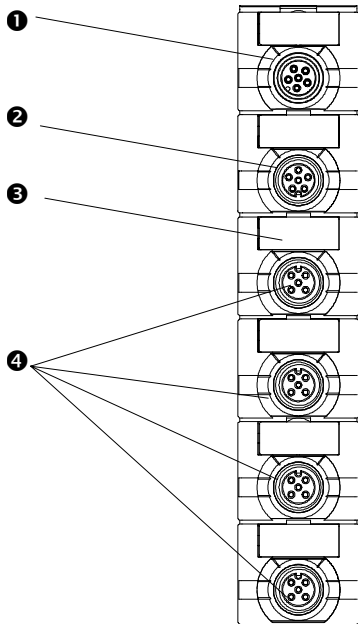


Fig. 2-10: Connections of the FD67DIM120008

❶ Connection for the internal system connection (incoming)
❷ Connection for the internal system connection (outgoing)
❸ Label plate
❹ M12 socket for sensors

2 Installation

2.4.2.7 Connections of the FD67DIOM080008

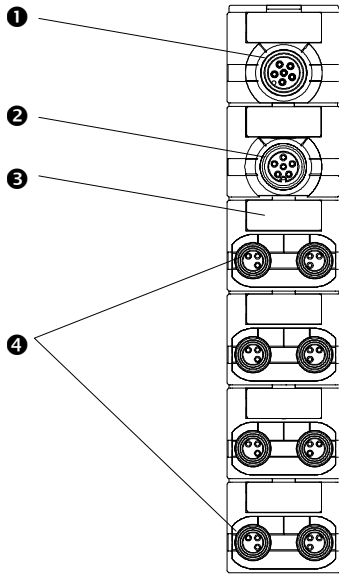


Fig. 2-11 : Connections of the FD67DIOM080008

❶ Connection for the internal system connection (incoming)
❷ Connection for the internal system connection (outgoing)
❸ Label plate
❹ M8 socket for sensors or actuators (internal actuator supply)

2.4.2.8 Connections of the FD67DIM080008

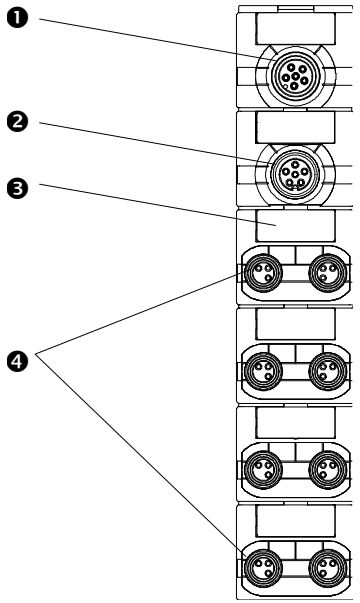


Fig. 2-12: Connections of the FD67DIM080008

❶ Connection for the internal system connection (incoming)
❷ Connection for the internal system connection (outgoing)
❸ Label plate
❹ M8 socket for sensors

2 Installation

2.4.2.9 Connections of the FD67AIVM120004

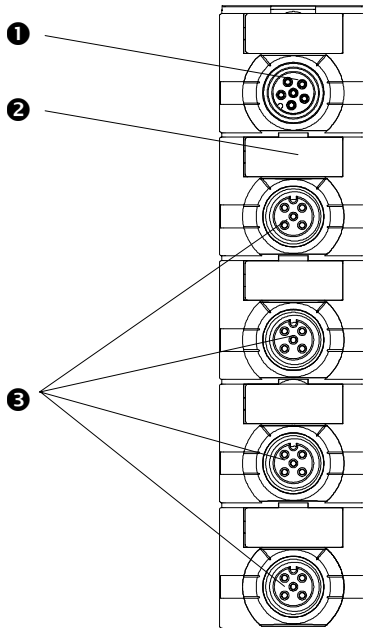


Fig. 2-13: Connections of the FD67AIVM120004

❶ Connection for the internal system connection
❷ Label plate
❸ M12 socket for analogue sensors / signals (voltage input)

2.4.2.10 Connections of the FD67AOVM120004

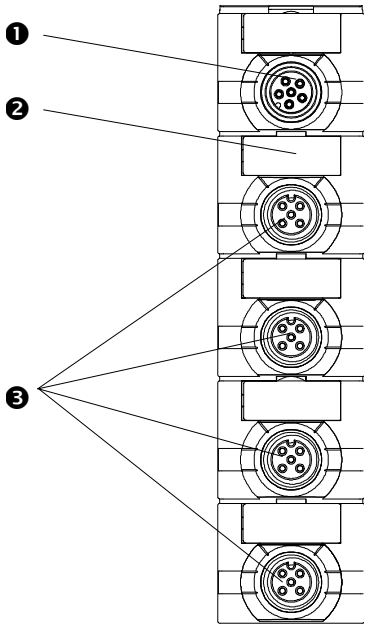


Fig. 2-14: Connections of the FD67AOVM120004

❶ Connection for the internal system connection
❷ Label plate
❸ M12 socket for analogue set-point module and power supply

2 Installation

2.4.2.11 Connections of the FD67AOCM120004

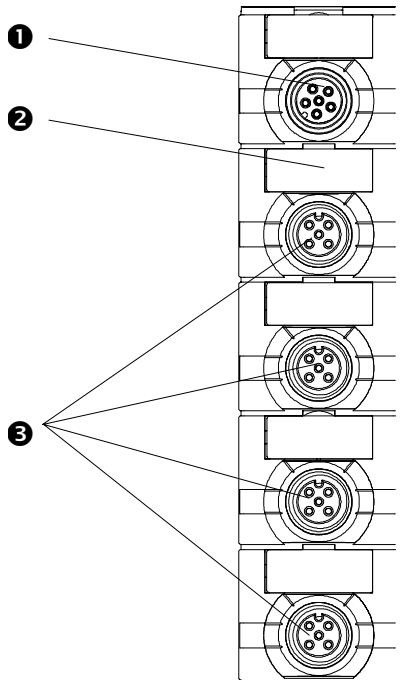


Fig. 2-15: Connections of the FD67AOCM120004

1. Connection for the internal system connection
2. Label plate
3. M12 socket for analogue set-point module (current output) and power supply

2.4.2.12 Connections of the FD67AICM120004

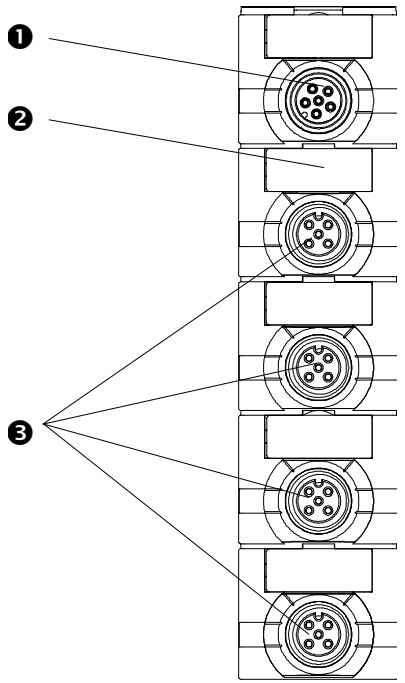


Fig. 2-16: Connections of the FD67AICM120004

1. Connection for the internal system connection
2. Label plate
3. M12 socket for analogue sensors / signals (current input)

2 Installation

2.4.2.13 Connections of the FD67PDM127804

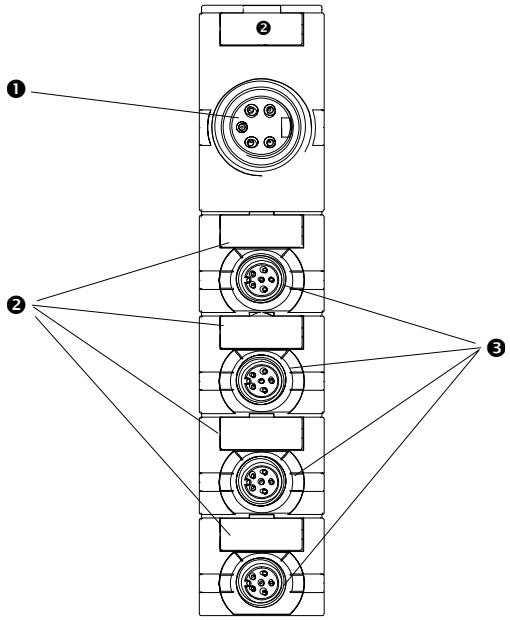


Fig. 2-17: Connections of the FD67PDM127804

❶ 7/8" connection for supplying the external actuator supply

❷ Label plate

❸ 6-pole M12 socket for the external actuator supply

2.4.2.14 Connections of the FD67DODSC0016

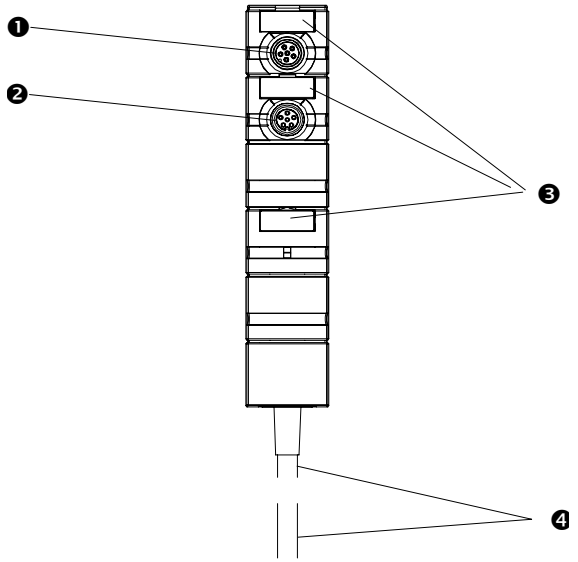


Fig. 2-18: Connections of the FD67DODSC0016

❶ Connection for the internal system connection (incoming)

❷ Connection for the internal system connection (outgoing)

❸ Label plate

❹ Customized and pre-wired cable end

Table 2-4: Cable assignments valve island control (colour code acc. to DIN 47 100)

Channel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	GND	Sens
Colour	white	brown	green	yellow	grey	pink	blue	red	black	purple	grey/pink	red/blue	white/green	brown/green	white/yellow	yellow/brown	white/grey	grey/brown

2 Installation

2.5 Wiring

Here are some recommendations for an appropriate wiring of the FD67 system.

Wire :

① the functional ground of the modules to the protection earth. See Chapter 2.5.1. This should already be done during the assembling phase. See Chapter 2.2 and 2.3.

② the peripheral connections of the I/O modules. See Chapter 2.5.2

③ the power distributor. See Chapter 2.5.5.

④ the internal system connection. See Chapter 2.5.4.

⑤ the hood of the bus node. See Chapter 2.5.9.

When attaching the conductors, make sure that the tightening torques are observed (field bus, internal system connection, I/O connections) in order to avoid errors or malfunction of the system.

CAUTION:

Inverting FD67 I/O modules in a system can result in injury or serious damage to man and/or material.

When comparing planned and actual configuration, the FD67 system is basically not able to distinguish between identical or replaceable modules. Therefore it is important, that FD67 system cables and FD67 I/O modules are clearly labelled.

2 Installation

2.5.1 Functional ground

2.5.1.1 Bus node

Initial conditions

» Wiring must be performed while the equipment is not under power.

Tools

» Screwdriver
» Stripper
» Cable terminal pliers

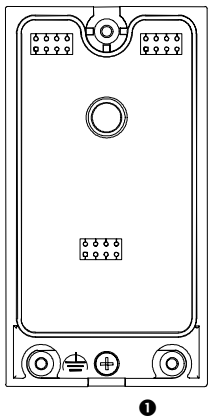
Accessories

» Fastening screw
» Cable terminal and locking ring
» Ground cable (wire)

The FE[3] connection is located on the bottom side of the bus node hood.

Fig. 2-19: FE connection on the bus node hood

❶ FE connection



The connection cable of the functional ground must be kept as short as possible, in accordance with EMC specifications.

2.5.1.2 I/O modules

Initial conditions

» Wiring must be performed while the equipment is not under power.

Tools

» Screwdriver
» Stripper
» Cable terminal pliers

Accessories

» Fastening screw
» Cable terminal and locking ring
» Ground cable (wire)

The functional ground connection is located under the label plate on single-row modules or modules with M8 sockets.

The connection cable of the functional ground must be kept as short as possible, in accordance with EMC specifications.

2 Installation

2.5.2 Digital I/O's with M12 connection

Initial conditions

» Wiring must be performed while the equipment is not under power.

Accessories

» Pre-wired conductors. Part No, see technical data sheets

or

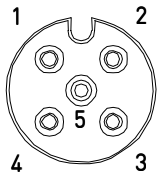
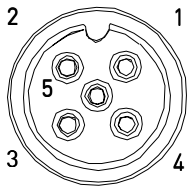
» Freely addressable conductors (3, 4, 5 wire with a cable cross-section ≤ 0,75 mm^2) and M12 coupler.

» M12 blind caps for unused M12 sockets.

Tools

If you use freely addressable conductors, you will possibly need a stripper and an adequate screwdriver.

Table 2-5: Pin assignments of M12 plug or M12 socket for digital inputs / outputs

Pin	Assignments	Outline	
		Socket (on module)	Plug (on connector)
1	24 V		
2	I/O signal		
3	Ground (GND)		
4	I/O signal		
5	Functional ground		

Connecting M12 plugs

① Insert the M12 plug into the corresponding M12 socket of the I/O module. See to it that the ends meet exactly and make sure that the plug is completely stuck into the socket.

② Screw down the plug.

Connecting Y distributors

Y distributors allow you to assign a sensor/actuator to both channels available on each M12 socket of digital modules.

① Insert the M12 plug into the corresponding M12 socket of the I/O module. See to it that the ends meet exactly and make sure that the plug is completely stuck into the socket.

② Screw down the plug.

CAUTION:

Unused sockets must be fitted with blind caps. Otherwise, protection class IP 67 is not assured.

2 Installation

2.5.3 Digital I/O's with M8 connection

Initial conditions

» Wiring must be performed while the equipment is not under power.

Accessories

» Pre-wired conductors. Part No, see technical data sheets

or

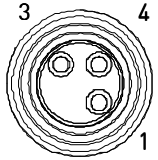
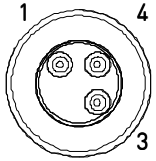
» Freely addressable conductors (3 wire with a cable cross-section ≤ 0,75 mm^2) and M8 coupler.

» M8 blind caps for unused M8 sockets.

Tools

If you use freely addressable conductors, you will possibly need a stripper and an adequate screwdriver.

Table 2-6: Pin assignments of M8 plug or M8 socket for digital inputs / outputs

Pin	Assignments	Outline	
		Socket (on module)	Plug (on connector)
1	24 V Sensor supply		
3	Ground (GND)		
4	I/O signal		

Connecting M8 plugs

① Insert the M18 plug into the corresponding M8 socket of the I/O module. See to it that the ends meet exactly and make sure that the plug is completely stuck into the socket.

② Screw down the plug.

CAUTION:

Unused sockets must be fitted with blind caps. Otherwise, protection class IP 67 is not assured.

2 Installation

2.5.4 Analogue I/O modules

Initial conditions

» Wiring must be performed while the equipment is not under power.

Accessories

» Pre-wired conductors. Part No, see technical data sheets

or

» Freely addressable conductors (3, 4-wire with a cable cross-section ≤ 0,75 mm^2) and M12 coupler with shielding.

» M12 blind caps for unused M12 sockets.

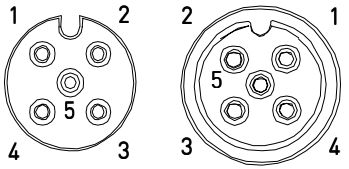
Tools

If you use freely addressable conductors, you will possibly need a stripper and an adequate screwdriver.

Shield connection analogue input signal

The shield is connected to the metal thread of the M12 socket. So it is advisable to use exclusively M12 connectors with metal thread. Bind the shield to the metal housing in the connector. This has not to be done if you use pre-wired conductors.

Table 2-7: Pin assignments of M12 plug or M12 socket for analogue I/O's

Pin	Assignments		Outline	
	Analogue IN	Analogue OUT	Socket (on module)	Plug (on connector)
1	24 V Sensor supply	24 V Sensor supply		
2	Analogue input +	Not used		
3	Ground (GND)	Ground (GND)		
4	Analogue input -	Analogue output		
5	Not used	Not used		

Connecting M12 plugs

① Insert the M12 plug into the corresponding M12 socket of the I/O module. See to it that the ends meet exactly and make sure that the plug is completely stuck into the socket.

② Screw down the plug.

2 Installation

2.5.5 Power distributor FD67PDM127804

Initial conditions

» Wiring must be performed while the equipment is not under power.

Tools

Stripper, screwdriver and a special tool if you do not use pre-wired conductors.

Connecting the auxiliary supply 7/8" plug

① Insert the plug of the power connector into the corresponding socket of the power distributor. See to it that the ends meet exactly and make sure that the plug is completely stuck into the socket.

② Screw down the plug.

Fig. 2-20:Pin assignments of the 7/8" power connector for FD67PDM127804 power distributor

Pin 1	0 V
Pin 2	0 V
Pin 3	FE
Pin 4	Not assigned
Pin 5	Actuator supply

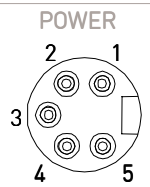
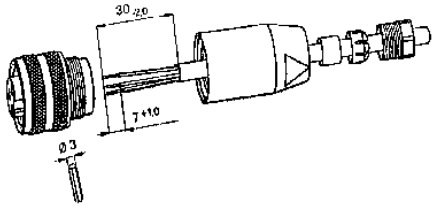


Fig. 2-21: Assembly of the 7/8" power connector (Mini-Style)



The max. admissible cable cross-section 1.5 mm². It is limited by the 7/8" connector.

2.5.6 Internal system connection

The internal system connection has 2 functions:

» Power supply of FD67 I/O modules.

» Communication between the bus node and I/O modules.

Initial conditions

» Wiring must be performed while the equipment is not under power.

Tools

None

Accessories

» Pre-wired conductors. Part No, see technical data sheets

Connecting the internal system connection

① Insert the plug of the internal system connection into the corresponding socket of the I/O module or the bus node. See to it that the ends meet exactly and make sure that the plug is completely stuck into the socket.

② Screw down the plug.

CAUTION:

Inverting FD67 I/O modules in a system can result in injury or serious damage to man and/or material.

When comparing planned and actual configuration, the FD67 system is basically not able to distinguish between identical or replaceable modules. Therefore it is important, that FD67 system cables and FD67 I/O modules are clearly labelled.

2 Installation

2.5.7 Termination of the internal system connection

The terminal resistor is already integrated into compact modules . If the last module in a branch is a compact module, there is no need to install an additional terminal resistor.

If the last module is an expander module, it must be fitted with a terminal resistor.

Each branch of the internal system connection of which the last module is an expander module must be fitted with a terminal resistor.

If no FD67 I/O module is connected to an interface of the bus node internal system connection, the interface must be fitted with a blind cap and not with a terminal resistor.

Table 2-8: Part No.terminal resistor and blind cap

Part No.	Description
FD67N	Terminating resistor for the internal system connection
FD67BLKM120000	Blind cap M12 x 1 (4 pcs)

2.5.8 External actuator supply (FD67DIOM121216 only!)

The parameterized outputs are supplied via the external actuator supply at the odd-numbered sockets 1, 3, 5 and 7 (channels 01, 03, 05, 07, 11, 13, 15, 17). The external actuator supply must be connected if outputs are to be used on these channels.

Initial conditions

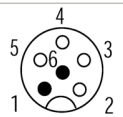
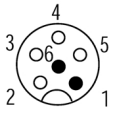
Wiring must be performed while the equipment is not under power.

Tools

Stripper and screwdriver if the actuator supply is not drawn from the bus node or the power distributor.

Accessories

Fig. 2-22: Pin assignments of external actuator supply

Assignments	Contact	Signification
 Male	1	Actuator supply + 24 V DC
	6	GND
 Female	1	Actuator supply + 24 V DC
	6	GND

2 Installation

2.5.9 Hood of the bus node

2.5.9.1 Connection of the 7/8" Power connector

Initial conditions

» Wiring must be performed while the equipment is not under power.

Tools

Stripper, screwdriver and a special tool if you do not use pre-wired conductors.

Connecting the auxiliary supply 7/8" plug

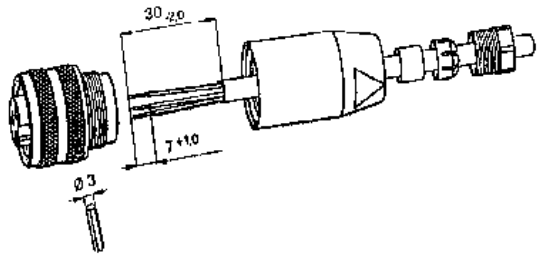
① Insert the plug of the power connector into the corresponding socket of the bus node. See to it that the ends meet exactly and make sure that the plug is completely stuck into the socket.

② Screw down the plug.

Fig. 2-23: Pin assignments of the 7/8" power connector (Mini-Style)

Pin 1	0 V	POWER
Pin 2	0 V	2 1 3 4 5
Pin 3	FE	
Pin 4	Sensor supply[5]	
Pin 5	Actuator supply	

Fig. 2-24: Assembly of the 7/8" power connector (Mini-Style)



The max. admissible cable cross-section 1.5 mm². It is limited by the 7/8" connector.

Auxiliary supply is required to supply sensors and actuators. The FD67 electronics is supplied via the sensor supply.

CAUTION:

The 7/8" connector is rated for a max. current of 9 A per pin.

CAUTION:

Wrong poling of the power supply can damage the module.

2.5.9.2 Bus connection

The bus node connection is described in the FD67 Bus system manual. See the following table for the Norgren references of theses User's manuals.

Table 2-9: Bus system manuals

Field bus system	Manual
Profibus DP	FD67 Profibus-DP manual
DeviceNet	FD67 DeviceNet manual

5 - On the FD67 Profibus-DP node, the power supply of the bus node electronics is drawn from the sensor supply.

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