Remote-I/O-System u-remote
I/O-Modules IP67 for PROFIBUS-DP
Manual

Let's connect.

UR67-PB-12-8DI-8-30K 2426360000
UR67-PB-12-8DIO-8-30K 2426330000

UR67-PB-78-16DI-12-60K 2426370000
UR67-PB-78-16DIO-12-60K 2426340000

UR67-PB-78-8DIDO-12-60M 2426380000
UR67-PB-78-16DI-12-60M 2426390000
UR67-PB-78-16DO-12-60M 2426400000

Weidmüller

Content

Manufacturer
Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 16
D-32758 Detmold
T +49 5231 14-0
F +49 5231 14-292083
info@weidmueller.de
www.weidmueller.com

Document No. 2484950000
Revision 00/March.2016

1 About this documentation

1.1 Symbols and notes

The safety notices in this documentation are designed according to the severity of the danger.

	DANGER
	Imminent risk to life! Notes with the signal word “Danger” warn you of situations which will result in serious injury or death if you do not follow the instructions given in this manual.

	WARNING
	Possible danger to life! Notes with the signal word “Warning” warn you of situations which may result in serious injury or death if you do not follow the instructions given in this manual.

	CAUTION
	Risk of injury! Notes with the signal word “Caution” warn you of situations which may result in injury if you do not follow the instructions given in this manual.

ATTENTION
Material damage! Notes with the signal word “Attention” warn you of hazards which may result in material damage.

Text next to this arrow are notes which are not relevant to safety, but provide important information about proper and effective work procedures.

The situation-dependent safety notices may contain the following warning symbols:

Symbol	Meaning
	Warning against hazardous electrical voltage
	Warning against electrostatically charged components
	Instruction: observe the documentation

- ► All instructions can be identified by the black triangle next to the text.
- – Lists are marked with a tick.

1.2 Complete documentation

The documentation is addressed to qualified electricians who are familiar with national and international laws, provisions and standards.

All documents are available to download from the Weidmüller website.

1.3 Standard data structure

All given details of data structure (e.g. process data, parameters) refer to the standard data format set in the parameters of the modules. These are represented in Motorola format.

2 Safety

This section includes general safety instructions for handling the u-remote IP67 modules. Specific safety instructions for specific tasks and situations are given at the appropriate places in the documentation.

	Work on the u-remote products may only be performed by qualified electricians that are familiar with the safety standards in automation technology.
	The documentation should be stored in a way that it is accessible for the personnel at any time.

2.1 General safety notice

When working during continued operations, the emergency stop mechanisms must not be made ineffective.
If a malfunction on a u-remote product cannot be fixed after following the recommended measures (see Chapter 9), the product in question must be sent back to Weidmüller. Weidmüller does not assume any liability if the base or electronic module has been tampered with!
All connected devices have to fulfill the requirements of EN 61558-2-4 and EN 61558-2-6. Only lines and accessories may be installed that fulfill the requirements and rules für safety, electromagnetic compatibility and telecommunication devices as well as the specifications. All information about approved lines and accessories are provided in this manual or available from Weidmüller.

Electrostatic discharge

u-remote products can be damaged or destroyed by electrostatic discharge. When handling the products, the necessary safety measures against electrostatic discharge (ESD) according to IEC 61340-5-1 and IEC 61340-5-2 must be observed. The packing and unpacking as well as the installation and disassembly of a device may only be carried out by qualified personnel and in accordance with the ESD information.

Fusing

The operator must set up the equipment so that it is protected against overloading. The upstream fuse must be designed such that it does not exceed the maximum load current. The maximum permissible load current of the u-remote components can be found in the technical data.
The operator has to decide whether additional overvoltage protection according to IEC 62305 is required. Voltages that exceed +/-30 V may cause the destruction of the modules. A power supply with protective separation has to be used for power feed-in.

Earthing (functional earth FE)

Each IP67 remote-I/O module is provided with an earthing connection. On the metall modules the connection point is indicated as „XE“. When using the modules made from plastics the earthing clamp has to be connected.
Further information are provided in Chapter 6 „Earthing and shielding“.

Shielding

Shielded lines are to be connected with shielded plugs in compliance with the relevant standard (see Chapter 6).

2.2 Intended use

The UR67 PROFIBUS-I/O modules are intended for use as decentralised input and output devices within a PROFIBUS-DP network in industrial automation. The products may only be used within the described technical specification.
The devices to be connected must fulfill the requirements according to EN 61558-2-4 and EN 61558-2-6.
The industrial environment is characterised by the fact that appliances are not connected directly with the public low voltage system. Special measurements have to be taken for the use in residential areas, business or trade areas.
Any intervention in the products hard or software other than described in this manual may only be realised by Weidmüller. Undisturbed operation is only be guaranteed with the housings completely closed. The observance of the documentation is part of the intended use.

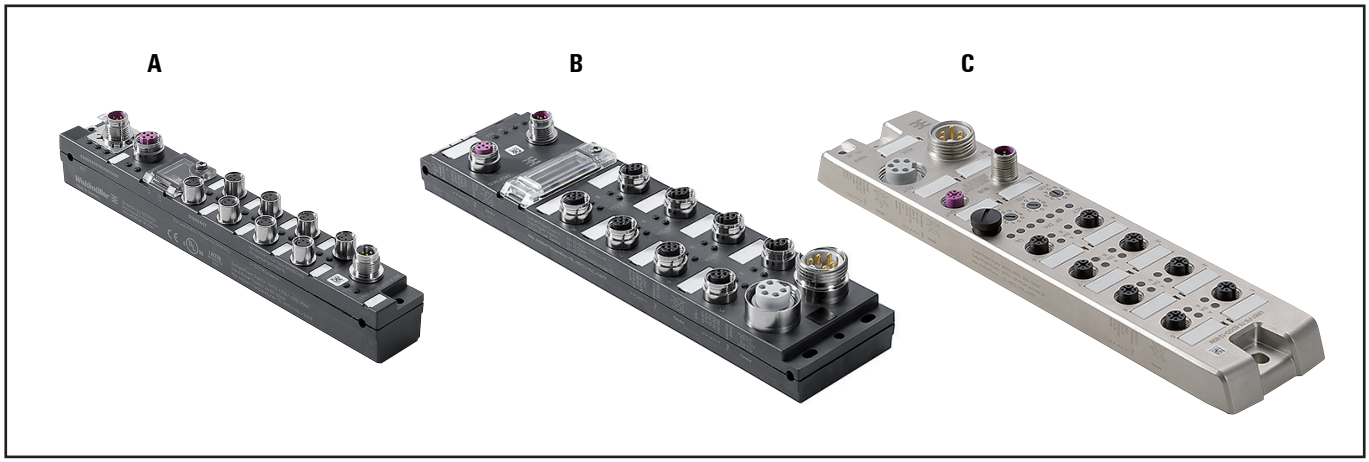
2.3 Legal notice

The u-remote IP67 series products are CE-compliant in accordance with Directive 2014/30/EU (EMC Directive).

Components of the following free software products are integrated into the u-remote products:

Component	Licence	Link
Ecos	modified GPL	http://ecos.sourceware.org/license-overview.html

3 System overview



u-remote-IP67 modules for PROFIBUS

The UR67 series of the u-remote system includes descrete fieldbus modules for the decentralised operation in rough industrial environment. The input and output data of the connected devices are transferred to a superior fieldbus system.

There are three designs of PROFIBUS-UR67 moduls each with different I/O functions:

Plastic housing, 30 mm wide (A):
- 8 digital inputs (UR67-PB-12-8DI-8-30K)
- 8 universal configurable channels (digital inputs or outputs) (UR67-PB-12-8DIO-8-30K)

Plastic housing, 60 mm wide (B):
- 16 digital inputs (UR67-PB-78-16DI-12-60K)
- 16 universal configurable channels (digital inputs or outputs) (UR67-PB-78-16DIO-12-60K)

Metal housing (zinc diecast) completely potted, 60 mm wide (C):
- 8 digital inputs, 8 digital outputs (UR67-PB-78-8DIDO-12-60M)
- 16 digital inputs (UR67-PB-78-16DI-12-60M)
- 16 digital outputs (UR67-PB-78-16DO-12-60M),

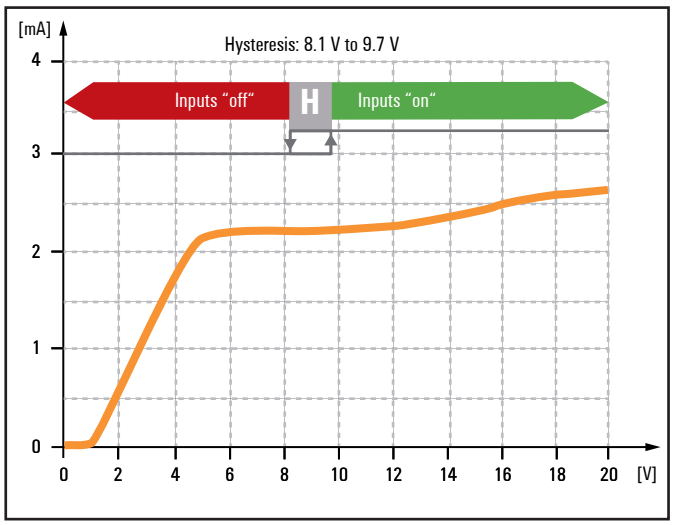
The output current is up to 1.6 A per channel. The output circuits are galvanically isolated from either the rest of the network and from the sensor electronics.

The modules with metal housing and output function provide a fail-safe-function: For each output channel it can be parameterised how to behave in case the communication is interrupted or failes.
The PROFIBUS network is connected via B-coded M12 plugs, the input and output signals of the peripheral devices are transferred via M8 or B-coded M12 plugs. The PROFIBUS plugs are colour coded (violett) an therefore not interchangeable. The power supply is connected via 5-pole, A-coded M12 or 7/8" plugs. LED indicators show the status of the module and of the single channels.
A detailed description of the individual module types is available in the subsequent chapter.

3.1 Type plate

Each module features a type plate on its long side, which includes identification information, the key technical specifications, certification symbols and the pin assignments of the connections.

3.2 Current-voltage characteristic



Current-voltage characteristic of p-switching digital inputs

3.3 Accessories

Protection caps

Protection class IP67 is only realised with a completely connected module. Therefore all connections that are not in use must be provided with protection caps.

Size	Usage	Protection cap	Order No.
M8	Sensor connection	SAI-SK M8	1802760000
M12	Sensor connection	SAI-SK M12	9456050000
M12	Bus-Out, Power-Out	SAI-SK-M12-UNI	2330260000
M12	Bus-In, Power-In	SAI-SK plug M12	1781520000

Markers

Module and connection markers are available as accessories for the purpose of item designation. All markers can be imprinted with the Weidmüller PrintJet ADVANCED (Order No. 1324380000).

Module	Marker	Order No.
Plastic housing, 30 mm (A)		
UR67-PB-12-8DI-8-30K	ESG 5/10 MC NE WS	1919940000
UR67-PB-12-8DIO-8-30K		
Plastic housing, 60 mm (B)		
UR67-PB-78-16DI-12-60K	ESG 9/20 MC NE WS	1609940000
UR67-PB-78-16DIO-12-60K)		
Metal housing, 60 mm (C)		
UR67-PB-78-8DIDO-12-60M	ESG-M8/20 MC NE WS	1027290000
UR67-PB-78-16DI-12-60M		
UR67-PB-78-16DO-12-60M		

Lines and connections

We recommend to use the product configurator on the Weidmüller website for choosing appropriate lines. The maximum permitted length of all lines has to be calculated regarding the electrotechnical standards.

4 Module descriptions

4.1 Digital input and output modules IP67, PROFIBUS, 30 mm, plastic housing

Digital input module UR67-PB-12-8DI-8-30K (Order No. 2426360000)
Digital input/output module UR67-PB-12-8DIO-8-30K (Order No. 2426330000)

The digital I/O modules IP67 are designed for the decentralised control within a PROFIBUS network. Each module provides eight ports (M8) for signal lines as well as fieldbus connection ports (M12, B-coded) and power supply ports (M12).

UR67-PB-12-8DI-8-30K

I/O module with 8 digital inputs (p-switching)

UR67-PB-12-8DIO-8-30K

I/O module with 8 digital channels (p-switching), configurable as inputs or outputs

ATTENTION

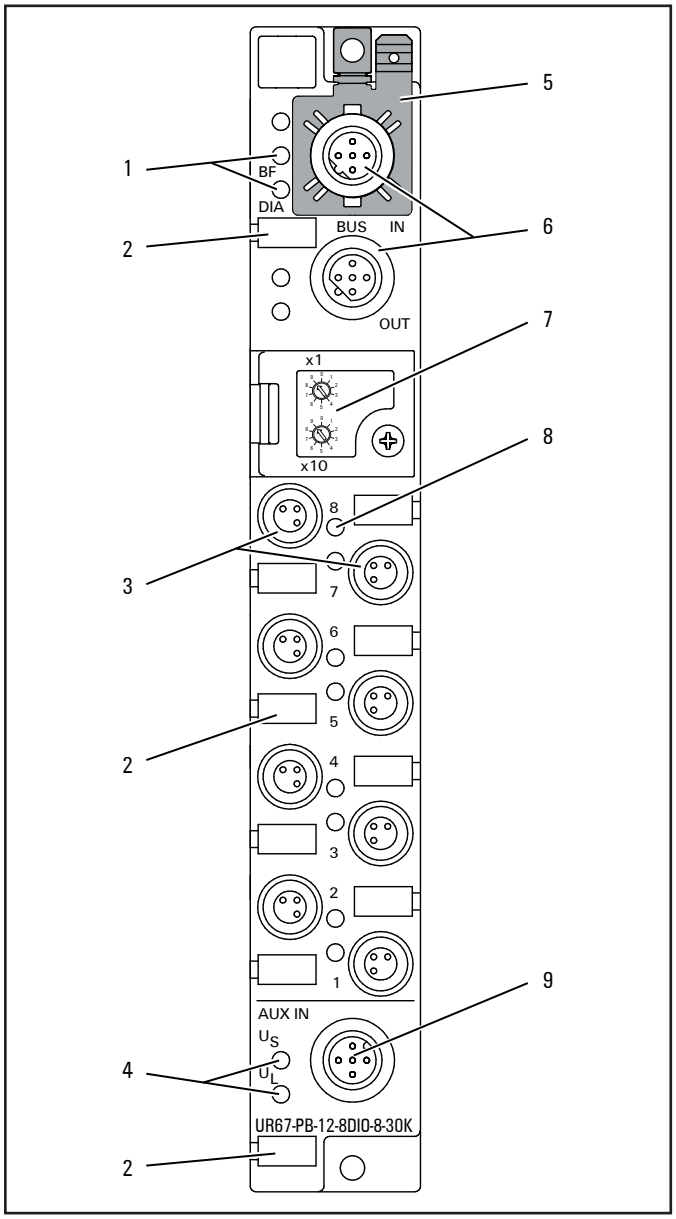
The product can be destroyed!
Using a power supply with current regulation or a wrong fuse will disable the reverse polaritiy protection.

► Protect the actuator supply with a overcurrent protection (6 A, mT) that will release at least 10 – 100 ms after a short circuit.

Diagnosis and status LED

LED	Indicator	Meaning
BF	red	Bus error
DIA	red	Collective indicator for peripheral errors
1 ... 8	yellow	Channel status
	red	Peripheral error
U_S	green	Sensor/system supply
U_L	green	Actuator supply

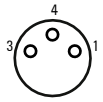
LED indicators, error messages see chapter 9

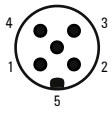


Product details UR67-PB-12-8DI-8-30K, UR67-PB-12-8DIO-8-30K

1 Status LED module
2 Marker
3 I/O connections 1 ... 8 (sensor/actuator)
4 Status LED power supply (U_S = system/sensor supply, U_L = actuator supply)
5 Earthing plate
6 PROFIBUS-DP connection
7 Rotary switch (PROFIBUS address)
8 Status LED channel 1 ... 8
9 Power supply system, sensor/actuator

Pin assignments

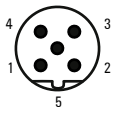
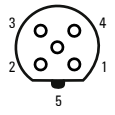
I/O connections			
M8, 3-pole		**8DI**	**8DIO**
	1	24 V	24 V
	3	GND	GND
	4	In	In/Out

Power supply			
M12, 5-pole		**8DI**	**8DIO**
	1	n. c.	24 V DC ± 25%
	2	24 V DC ± 25%	24 V DC ± 25%
	3	internally bridged GND	GND
	4		GND
	5	FE	FE

ATTENTION

Product can be destroyed!

► Please do never position the power supply (24 V DC) at the signal or data lines (pin 1 to pin 4).

PROFIBUS-DP			
M12, 5-pole, B-coded		**Signal**	**Function**
 Male IN  Female OUT	1	VP[1)]	+5 V
	2	RxD/TxD- N	Channel A
	3	DGND (0V)[1)]	GND
	4	RxD/TxD- P	Channel B
	5	n.c.	FE

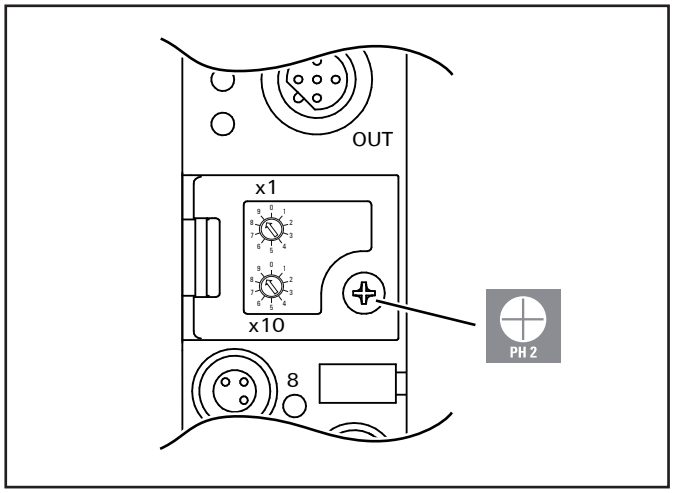
1) Internal signals that can be used to supply a terminating resistor (Order No. 1784770000). They may never be wired up or forwarded to other participants.

PROFIBUS address

You can set the module's PROFIBUS address either using the rotary switches or via the PROFIBUS-DP network. A value between 1 and 99 (default 99) is possible using the rotary switches, via the PROFIBUS-DP network you can choose a value between 1 and 126.

The address set will be adopted during switching on the power supply. For a change the power supply has to be interrupted temporarily.

Setting the address manually



Rotary switches on the module

► Open the clear cover (crosshead srewdriver 2 mm).
► Set the address using the rotary switches (unit position above, decade below).
► Close the clear cover.

The address set will be adopted during the next switch-on of the power supply.

Changing the address

► Set the new address as described above.
► Interrupt the power supply temporarily.

The new address set will be adopted during the next switch-on of the power supply.

Setting the address via the network

Prior to this you have to set the rotary switches to "00". This setting may not be changed during operation. You will find a detailed description in the manaul of your respective PROFIBUS-DP-master.

Data transfer rate

The data trasfer rate will be detected and set automatically as soon as the module communicates with the master (auto baud detection).

Process data and bit assignment

The PROFIBUS-DP telegram permits the transmission of 244 bytes user data at maximum.

The UR67-PB-12-8DI-8-30K module can transmit one byte (input only) .
The UR67-PB-12-8DIO-8-30K module uses – depending on the configuration

- 8DI/8DO: one input byte and one output byte
- 8DI: one input byte
- 8DO: one output byte

Bit	7	6	5	4	3	2	1	0
M8 Input								
Byte 0	8	7	6	5	4	3	2	1
M8 Output								
Byte 0	8	7	6	5	4	3	2	1

Technical data	UR67-PB-12-8DI-8-30K (2426360000)	UR67-PB-12-8DIO-8-30K (2426330000)
Bus system		
Protocol	PROFIBUS-DP	
ID number	09C9 hex	
GSD file	WIUR09C9.GSD	
Data transfer rate	9.6 / 19.2 / 45.45 / 93.75 /187.5 / 500 KBit/s / 1.5 / 3.0 / 6.0 / 12.0 MBit/s Auto baud detection with start of communication	
Address range		
Adjustable via PROFIBUS	1–126 dec	
Adjustable via rotary switches	1–99 dec (default: 99 dec)	
Port	M12, 5-pole, B-coded	
Inputs		
Number of digital channels	8	max. 8 configurable
Channel type	NO contact, p-switching	
Input type	Type 3 acc. to IEC 61131-2	
Rated input voltage	24 V DC	
Input current at 24 V DC	typ. 5 mA	
Short-circuit-proof	yes	
Status indicator	LED yellow, channel-wise	
Diagnosis indicator	LED red, channel-wise	
Port	M8, 3-pole	
Outputs		
Number of digital channels	-	max. 8 configurable
Channel type	-	NO contact, p-switching
Output current	-	typ. 0.5 A acc. IEC 61131-2
Rated output current per channel [1]	-	0.5 A
Signal status "1"	-	max. 0.6 A
Signal status "0"	-	max. 1 mA (standard specifications)
Signal gauge of the outputs		
Signal status "1"	-	min. (U_L – 1 V)
Signal status "0"	-	max. 2 V
Short-circuit-proof	-	yes
Max. current rating	-	4 A/module
Overload resistant	-	yes
Status indicator	-	LED yellow, channel-wise
Diagnosis indicator	-	LED red, channel-wise
Port	-	M8, 3-pole

1) With inductive loads of utilisation category DC13 (acc. EN 60947-5-1) the outputs can switch currents of 0.5 A with a frequency of 1 Hz.

Technical data	UR67-PB-12-8DI-8-30K (2426360000)	UR67-PB-12-8DIO-8-30K (2426330000)
Supply of electronics/sensor system		
Rated voltage U_S	24 V DC	
Voltage range	24 V DC ± 25%	
Current consumption electronics	typ. 65 mA	
Voltage sensors	min. (U_{System} – 1.5 V)	
Current consumption sensor system/ channel	max. 100 mA (at T_u 30 °C)	
Reverse polarity protection[1)]	yes	
Supply indicator (U_S)	LED green	
Connection	M12, 5-pole	
Supply of actuators		
Rated voltage U_L	-	24 V DC
Voltage range	-	24 V DC ± 25%
Potential isolation	-	yes
Low voltage threshold	-	typ. 17 V
Low voltage detection delay	-	< 20 ms
Reverse polarity protection	-	yes
Actuator supply indicator (U_L)	-	LED green
Connection	-	M12, 5-pole
General data		
Protection class	IP 67 (only with all sockets closed)	
Ambient temperature	-10 °C ... +60 °C	
Weight	200 g	
Housing material	Plastics (PBT)	
Vibration resistance oscillation	15 g / 5 ... 500 Hz	
Vibration resistance shock	50 g / 11 ms	
Tightening torques		
Mounting screw M4	1.0 Nm	
Plug-in connector M8	0.3 Nm	
Plug-in connector M12	0.6 Nm	

1) With inductive loads of utilisation category DC13 (acc. EN 60947-5-1) the outputs can switch currents of 0.5 A with a frequency of 1 Hz.

4.2 Digital input and output modules IP67, PROFIBUS, 60 mm, plastic housing

Digital input module UR67-PB-78-16DI-12-60K (Order No. 2426370000)
Digital input/output module UR67-PB-78-16DIO-12-60K (Order No. 2426340000)

The digital I/O modules IP67 are designed for the decentralised control within a PROFIBUS network. Each module provides eight ports (M12, A-coded) for signal lines as well as fieldbus connection ports (M12, B-coded) and power supply ports (7/8").

UR67-PB-78-16DI-12-60K

I/O module with 16 digital inputs (p-switching)

UR67-PB-78-16DIO-12-60K

I/O module with 16 digital channels (p-switching), configurable as input or outputs

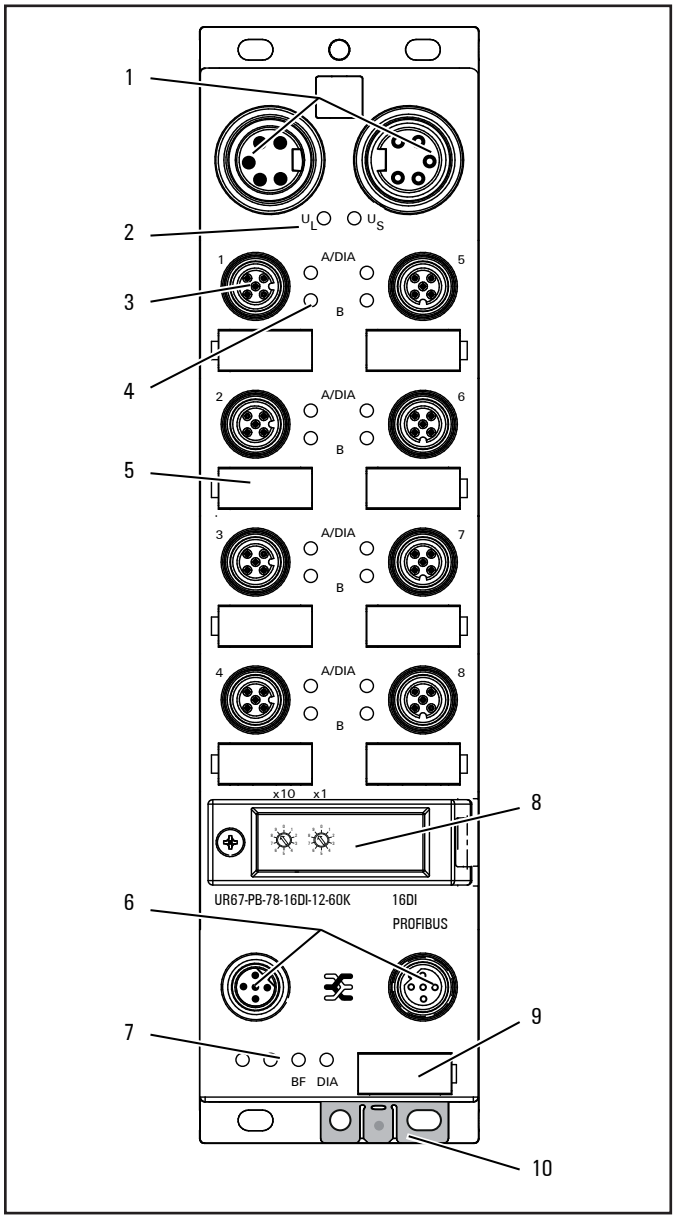
ATTENTION

The product can be destroyed!
Using a power supply with current regulation or a wrong fuse will disable the reverse polaritiy protection.
► Protect the actuator supply with a overcurrent protection (6 A, mT) that will release at least 10 – 100 ms after a short circuit.

Diagnosis and status LED

LED	Indicator	Meaning
U_L	green	Actuator supply
U_S	green	Sensor/system supply
1 ... 8 A/DIA	yellow	Status channel A
1 ... 8 B	yellow	Status channel B
1 ... 8 A/DIA	red	Peripheral error (actuator undervoltage, sensor or actuator short circuit)
1 ... 8 B	red	Peripheral error (actuator undervoltage, sensor or actuator short circuit)
BF	red	Bus error
DIA	red	Collective indicator for peripheral errors

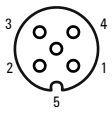
LED indicators, error messages see chapter 9

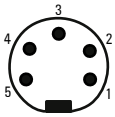
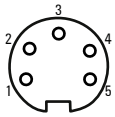


Product details UR67-PB-78-16DI-12-60K, UR67-PB-78-16DIO-12-60K

1 Power supply system, sensor/actuator
2 Status LED power supply (actuator U_L, system/sensor U_S)
3 I/O connections (sensor/actuator)
4 Status LED channel
5 Channel marker
6 PROFIBUS-DP plug
7 Status-LED module
8 Rotary switches (PROFIBUS address)
9 Module marker
10 Earthing plate

Pin assignments

I/O connections			
M12, 5-pole		**16DI**	**16DIO**
	1	24 V	24 V
	2	In B	In/Out B
	3	GND	GND
	4	In A	In/Out A
	5	FE	FE

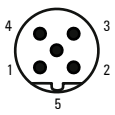
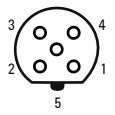
Power supply			
7/8", 5-pole		**16DI**	**16DIO**
	1	n. c.	GND
	2	GND	GND
	3	FE	FE
	4	24 V DC ± 25%	24 V DC ± 25%
	5	n. c.	24 V DC ± 25%

The internal "T-piece" is connected through 5-pole even with the UR67-PB-78-16DI-12-60K module.

ATTENTION

Product can be destroyed!

► Please do never position the power supply (24 V DC) at the signal or data lines (pin 1 to pin 4).

PROFIBUS-DP			
M12, 5-pole, B-coded		**Signal**	**Function**
 Male IN	1	VP[1)]	+5 V
	2	RxD/TxD- N	Channel A
	3	GND (0V)[1)]	GND
 Female OUT	4	RxD/TxD- P	Channel B
	5	n.c.	FE

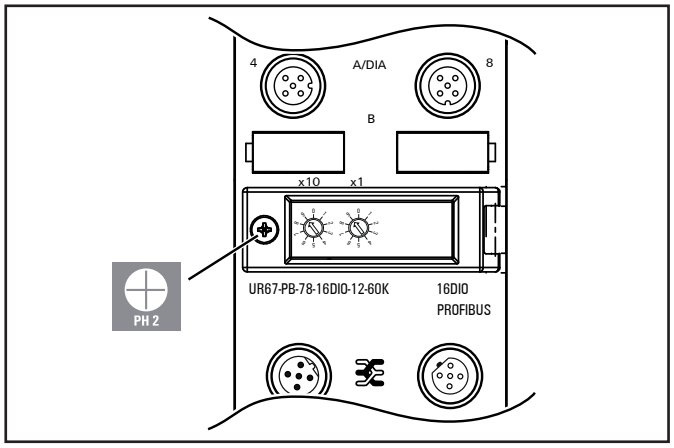
1) Internal signals that can be used to supply a terminating resistor (Order No. 1784770000). They may never be wired up or forwarded to other participants.

PROFIBUS address

You can set the module's PROFIBUS address either using the rotary switches or via the PROFIBUS-DP network. A value between 1 and 99 (default 99) is possible using the rotary switches, via the PROFIBUS-DP network you can choose a value between 1 and 126.

The address set will be adopted during switching on the power supply. For a change the power supply has to be interrupted temporarily.

Setting the address manually



Rotary switches on the module

► Open the clear cover (crosshead srewdriver 2 mm).
► Set the address using the rotary switches (decade left, unit position right).
► Close the clear cover.

The address set will be adopted during the next switch-on of the power supply.

Changing the address

► Set the new address as described above.
► Interrupt the power supply temporarily.

The new address set will be adopted during the next switch-on of the power supply.

Setting the address via the network

Prior to this you have to set the rotary switches to "00". This setting may not be changed during operation. You will find a detailed description in the manual of your respective PROFIBUS-DP-master.

Data transfer rate

The data transfer rate will be detected and set automatically as soon as the module communicates with the master (auto baud detection).

Process data and bit assignment

The PROFIBUS-DP telegram permits the transmission of 244 bytes user data at maximum.

The UR67-PB-78-16DI-12-60K module can transmit two bytes (input only).
The UR67-PB-78-16DIO-12-60K module uses, depending on the configuration,

- 8DI/8DO: two input and two output bytes
- 16DI: two input bytes
- 16DO: two output bytes

Bit	7	6	5	4	3	2	1	0
M12 input								
Byte 0	4B	4A	3B	3A	2B	2A	1B	1A
Byte 1	8B	8A	7B	7A	6B	6A	5B	5A
M12 output								
Byte 0	4B	4A	3B	3A	2B	2A	1B	1A
Byte 1	8B	8A	7B	7A	6B	6A	5B	5A

When using the UR67-PB-78-16DIO-12-60K module with 8DI/8DO configuration the channels 1 to 4 (left hand socket row) are determined to the input bytes whereas the channels 5 to 8 (right hand socket row) are determined to the output byte.

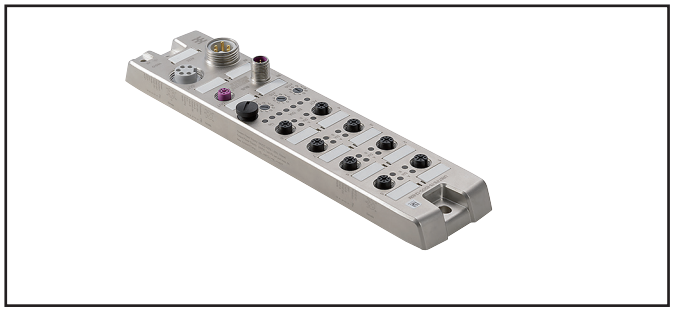
Technical data	UR67-PB-78-16DI-12-60K (2426370000)	UR67-PB-78-16DIO-12-60K (2426340000)
Bus system		
Protocol	PROFIBUS-DP	
ID number	09CA hex	
GSD file	WIUR09CA.GSD	
Data transfer rate	9.6 / 19.2 / 45.45 / 93.75 /187.5 / 500 KBit/s / 1.5 / 3.0 / 6.0 / 12.0 MBit/s Auto baud detection with start of communication	
Address range		
Adjustable via PROFIBUS	1 ... 126 dec	
Adjustable via rotary switches	1 ... 99 dec (default: 99 dec)	
Connection	M12, 5-pole, B-coded	
Inputs		
Number of digital channels	16	max. 16 configurable
Channel type	NO contact, p-switching	
Input type	Type 3 acc. IEC 61131-2	
Rated input voltage	24 V DC	
Input current at 24 V DC	typ. 5 mA	
Short-circuit-proof	yes	
Status indicator	LED yellow, channel-wise	
Diagnosis indicator	LED green, per socket	
Connection	M12, 5-pole, A-coded	
Outputs		
Number of digital channels	-	max. 16 configurable
Channel type	-	NO contact, p-switching
Output current	-	typ. 1.6 A acc. IEC 61131-2
Rated output current per channel [1]	-	1.6 A
Signal status „1“	-	max. 1.9 A
Signal status „0“	-	max. 1 mA (standard specifications)
Signal gauge der Outputs		
Signal status „1“	-	min. (U_L - 1 V)
Signal status „0“	-	max. 2 V
Short-circuit-proof	-	yes
Max. current rating	-	9 A/module[2]
Overload resistant	-	yes
Status indicator	-	LED yellow, channel-wise
Diagnosis indicator	-	LED red channel-wise
Connection	-	M12, 5-pole, A-coded

1) With inductive loads of utilisation category DC13 (acc. EN 60947-5-1) the outputs can switch currents of 0.5 A with a frequency of 1 Hz.
2) Technically feasible and allowed under the following conditions: looped through sensor/system supply max. 2.5 A; power supply cable STL 204 (5 x 1.0 mm²); ambient temperature max. 40 °C; max. current rating 12 A

Technical data	UR67-PB-78-16DI-12-60K (2426370000)	UR67-PB-78-16DIO-12-60K (2426340000)
Supply electronics/sensors		
Rated voltage U_S	24 V DC	
Voltage range	24 V DC ± 25%	
Current consumption electronics	typ. 70 mA	
Voltage sensors	min. (U_{System} - 1.5V)	
Current consumption sensors	max. 200 mA (at T_u 30°C)	
Reverse polarity protection	yes	
Supply indicator (U_S)	LED green	
Connection	7/8", 5-pole	
Supply electronics/actuators		
Rated voltage U_L	-	24 V DC
Voltage range	-	24 V DC ± 25%
Potential isolation	-	yes
Low voltage threshold	-	typ. 17 V
Low voltage detection delay	-	< 20 ms
Reverse polarity protection	-	yes
Actuator supply indicator (U_L)	-	LED green
Connection	-	7/8", 5-pole
General data		
Protection class	IP 67 (only with all sockets closed)	
Ambient temperature	-10°C ... +60°C	
Weight	380 g	
Housing material	Plastics (PBT)	
Vibration resistance Schwingen	15 g / 5 ... 500 Hz	
Vibration resistance Schocken	50 g / 11 ms	
Tightening torques		
Mounting screw M4	1.0 Nm	
Plug-in connector M12	0.6 Nm	

1) With inductive loads of utilisation category DC13 (acc. EN 60947-5-1) the outputs can switch currents of 0.5 A with a frequency of 1 Hz.
2) Technically feasible and allowed under the following conditions: looped through sensor/system supply max. 2.5 A; power supply cable STL 204 (5 x 1.0 mm²); ambient temperature max. 40 °C; max. current rating 12 A

4.3 Digital input and output modules IP67, PROFIBUS, 60 mm, metal housing



Digital input/output module UR67-PB-78-8DIDO-12-60M (Order No. 2426380000)
Digital input module UR67-PB-78-16DI-12-60M (Order No. 2426390000)
Digital output module UR67-PB-78-16DO-12-60M (Order No. 2426400000)

The digital I/O modules IP67 are designed for the decentralised control within a PROFIBUS network. Each module provides eight ports (M12, A-coded) for signal lines. The fieldbus connection ports (M12, B-coded) and the power supply ports (7/8") are provided with an integrated T-piece. Thereby the PROFIBUS as well as the power supply can be connected through to the subsequent participants without additional T-pieces. The die cast zinc housing is completey potted.
The output current per channel is 1.6 A at maximum, the output current circuits are galvanically isolated from the remaining network and from the sensor electronics.
The modules with output function provide a fail-safe function. For these modules the behaviour of each output in case of communication failure or interruption can be configured.

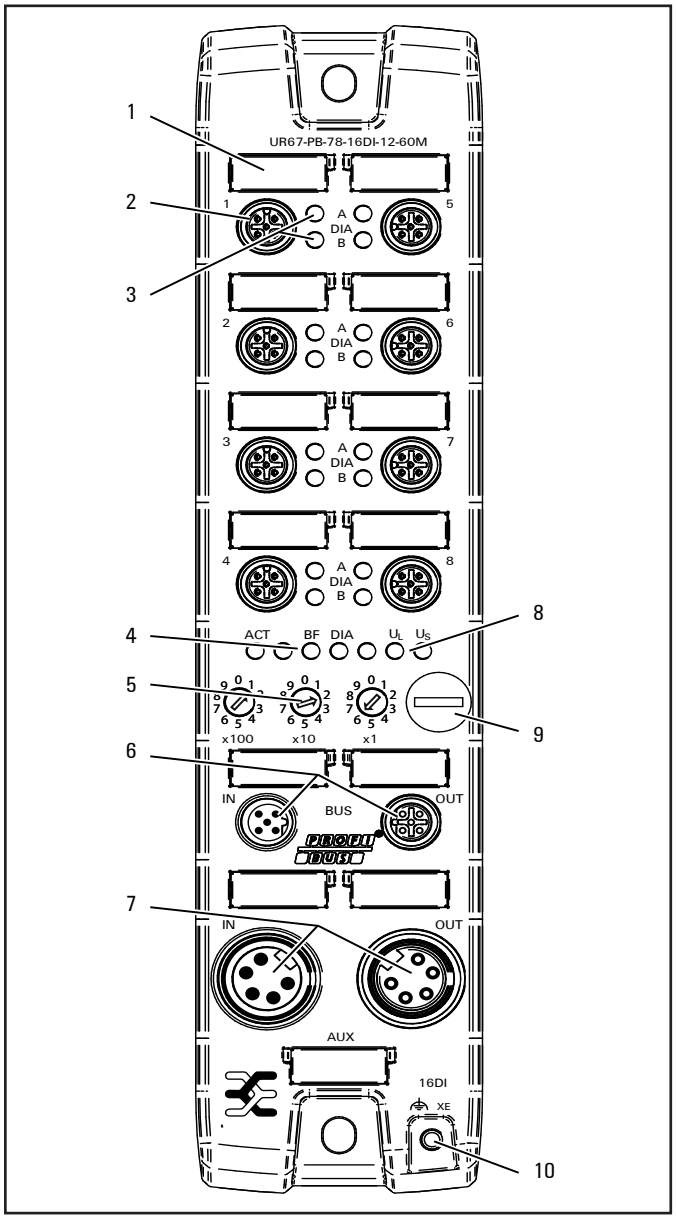
UR67-PB-78-8DIDO-12-60M
I/O module with 8 digital inputs and 8 digital outputs

UR67-PB-78-16DI-12-60M
I/O module with 16 digital inputs

UR67-PB-78-16DO-12-60M
I/O module with 16 digital outputs

ATTENTION

The product can be destroyed!
Using a power supply with current regulation or a wrong fuse will disable the reverse polaritiy protection.
► Protect the actuator supply with a overcurrent protection (6 A, mT) that will release at least 10 – 100 ms after a short circuit.



Product details UR67-PB-78-16DI-12-60M, UR67-PB-78-8DIDO-12-60M

1 Marker
2 I/O connections 1 ... 8 (sensor/actuator)
3 Status LED channel A / channel B
4 Status LED module
5 Rotary switches (PROFIBUS address)
6 Connection PROFIBUS-DP
7 Supply system, sensor/actuator
8 Status LED supply (U_S = supply system-/sensor, U_L = supply actuator)
9 Micro USB interface (for service use only)
10 Earthing terminal (M4 thread)

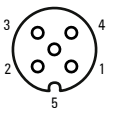
Diagnosis and status LED

LED	Indicator	Meaning
Module related LED		
ACT	yellow	Data exchange with PROFIBUS master
BF	red	Bus error, no communication
	off	No error
DIA	red	Collective message for peripheral errors
	off	No error message exsisting
U_S	green	Sensor/system supply 24 V DC ± 25%
	red	Sensor/system supply U_S < 18 V or U_S > 30 V
	off	No sensor/system supply
U_L	green	Actuator supply 24 V DC ± 25%
	red	Actuator supply U_L < 18 V or U_L > 30 V
	off	No actuator supply
Channel related LED		
1 ... 8 A	yellow	Channel A „on“
	red	Peripheral error (actuator undervoltage, sensor or actuator short circuit)
	off	Not connected, status „off“, no error
1 ... 8 B	white	Channel B „on“
	red	Peripheral error (actuator undervoltage, actuator short circuit)
	off	Not connected, status „off“, no error

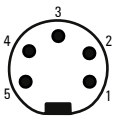
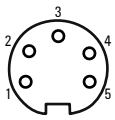
LED indicators, error messages see chapter 9

Connection assignments

I/O connections

M12, A-coded		8DIDO	16DI	16DO
	1	X1...X4: 24 V X5...X8: n. c.	24 V	n. c.
	2	X1...X4: In B X5...X8: Out B	In B	Out B
	3	GND	GND	GND
	4	X1...X4: In A X5...X8: Out A	In A	Out A
	5	FE	FE	FE

Voltage supply

7/8"		16DI	8DIDO, 16DO
	1	Internally bridged with contact 5	GND (0 V) DC
	2	GND (0 V) DC	GND (0 V) DC
	3	FE	FE
	4	24 V DC ± 25%	24 V DC ± 25%
	5	Internally bridged with contact 1	24 V DC ± 25%

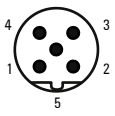
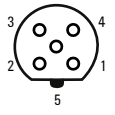
Power supply units for the system/sensor supply and the actuator supply must conform to SELV or PELV.

ATTENTION

Product can be destroyed!

► Please do never position the power supply (24 V DC) at the signal or data lines (pin 1 to pin 4).

PROFIBUS-DP

M12, B-coded		Signal	Function
 Male IN	1	VP[1)]	+5 V
	2	RxD/TxD- N	Channel A
	3	GND (0V)[1)]	GND
 Female OUT	4	RxD/TxD- P	Channel B
	5	n.c.	FE

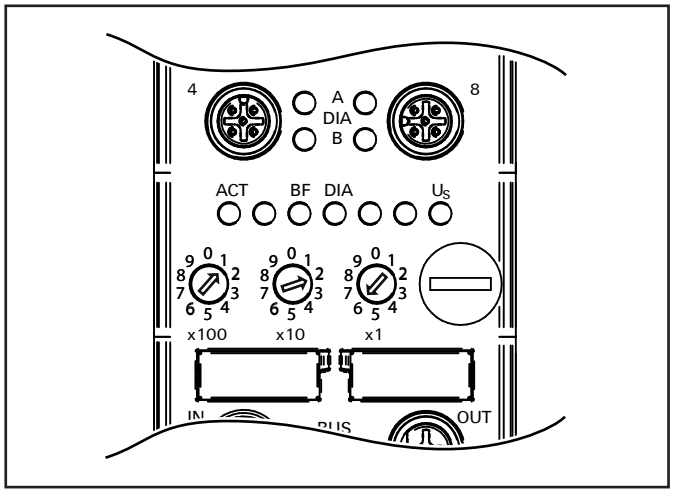
1) Internal signals that can be used to supply a terminating resistor (Order No. 1784770000). They may never be wired up or forwarded to other participants.

PROFIBUS address

You can set the module's PROFIBUS address either using the rotary switches or via the PROFIBUS-DP network. A value between 1 and 126 is possible (default 126). If an address >126 has been set with the rotary switches, the address will be automatically be set to 126.

The address set will be adopted during switching on the power supply. For a change the power supply has to be interrupted temporarily.

Setting the address manually



Rotary switches on the module

► Set the address with the rotary switches (hundred left, decade middle, unit position right).

The address set will be adopted during the next switch-on of the power supply.

Changing the address

► Set the new address as described above.
► Interrupt the power supply temporarily.

The new address set will be adopted during the next switch-on of the power supply.

Setting the address via the network

Prior to this you have to set the rotary switches to "000". This setting may not be changed during operation. You will find a detailed description in the manual of your respective PROFIBUS-DP-master.

Data transfer rate

The data transfer rate will be detected and set automatically as soon as the module communicates with the master (auto baud detection).

Technical data	UR67-PB-78-8DIDO-12-60M (2426380000)	UR67-PB-78-16DI-12-60M (2426390000)	UR67-PB-78-16DO-12-60M (2426400000)
Bus system			
Protocol	PROFIBUS-DP		
ID number	0E94 hex		
GSD file	WIUR0E94.GSD		
Data transfer rate	9.6 / 19.2 / 45.45 / 93.75 /187.5 / 500 KBit/s / 1.5 / 3.0 / 6.0 / 12.0 MBit/s Auto baud detection with start of communication		
Address range			
Adjustable via PROFIBUS	1 ... 126 dec		
Adjustable via rotary switches	1 ... 126 dec (default: 99 dec)		
Connection	M12, 5-pole, B-coded		
Inputs			
Number of digital channels	8	16	-
Channel type	NO contact, p-switching		-
Input type	Type 3 acc. IEC 61131-2		-
Rated input voltage	24 V DC		-
Input current at 24 V DC	typ. 5 mA		-
Short-circuit-proof	yes		-
Status indicator	LED yellow (channel A), LED white (channel B)		-
Diagnosis indicator	LED red, per M12 socket		-
Connection	M12, 5-pole, A-coded		-
Outputs			
Number of digital channels	8	-	16
Channel type	NO contact, p-switching	-	NO contact, p-switching
Output current	typ. 1.6 A acc. IEC 61131-2	-	typ. 1.6 A acc. IEC 61131-2
Rated output current per channel [1]	1.6 A	-	1.6 A
Signal status "1"	max. 1.6 A	-	max. 1.6 A
Signal status "0"	max. 1 mA (standard specifications)	-	max. 1 mA (standard specifications)
Signal gauge of outputs			
Signal status "1"	min. (U_L – 1 V)	-	min. (U_L – 1 V)
Signal status "0"	max. 2 V	-	max. 2 V
Short-circuit-proof	yes	-	yes
Max. current rating per module	9.0 A (12 A[2])	-	9.0 A (12 A[2])
Overload resistant	yes	-	yes
Status indicator	LED yellow (channel A) LED white (channel B)	-	LED yellow (channel A) LED white (channel B)
Diagnosis indicator	LED red, channel-wise	-	LED red, channel-wise
Connection	M12 socket, 5-pole, A-coded	-	M12 socket, 5-pole, A-coded

1) With inductive loads of utilisation category DC13 (acc. EN 60947-5-1) the outputs can switch currents of 0.5 A with a frequency of 1 Hz.
2) Technically feasible and allowed under the following conditions: looped through sensor/system supply max. 2.5 A; minimal cross section of the power supply cable 5 x 1.0 mm²; ambient temperature max. 40 °C (104 °F)

Technical data	UR67-PB-78-8DIDO-12-60M (2426380000)	UR67-PB-78-16DI-12-60M (2426390000)	UR67-PB-78-16DO-12-60M (2426400000)
Supply electronics/sensors			
Rated voltage U_S	24 V DC (SELV/PELV)		
Voltage range	24 V DC ± 25%		
Current consumption electronics	typ. 60 mA		
Voltage sensors	min. (U_{System} - 1.5 V)		
Current consumption sensors	max. 200 mA (at T_u 30 °C)		
Reverse polarity protection	yes		
Supply indicator (U_S)	LED green/red		
Connection	MINI, 7/8" plug and socket, 5-pole		
Supply of actuators			
Rated voltage U_L	24 V DC (SELV/PELV)	-	24 V DC (SELV/PELV)
Voltage range	24 V DC ± 25%	-	24 V DC ± 25%
Potential isolation	yes	-	yes
Low voltage threshold	typ. 17 V	-	typ. 17 V
Low voltage detection delay	typ. 300 ms	-	typ. 300 ms
Reverse polarity protection	yes	-	yes
Actuator supply indicator (U_L)	LED green/red	-	LED green/red
Connection	MINI, 7/8" plug and socket, 5-pole	-	MINI, 7/8" plug and socket, 5-pole
General data			
Protection class	IP 67 (only with all sockets closed)		
Ambient temperature	-10 °C ... +60 °C		
Weight	605 g		
Housing material	Zinc diecast		
Vibration resistance vibrations	15 g / 5 ... 500 Hz		
Vibration resistance schock	50 g / 11 ms		
Tightening torques			
Mounting screw M6	1.0 Nm		
Plug-in connector M12	0.6 Nm		

1) With inductive loads of utilisation category DC13 (acc. EN 60947-5-1) the outputs can switch currents of 0.5 A with a frequency of 1 Hz.
2) Technically feasible and allowed under the following conditions: looped through sensor/system supply max. 2.5 A; minimal cross section of the power supply cable 5 x 1.0 mm²; ambient temperature max. 40 °C (104 °F)

Editable parameter

Overview of the editable parameter

Channel	Name	Options	Default
1 ... 8	Channel Diagnostics	Disabled / Enabled	Enabled
1 ... 8	Actuator Low Voltage Detection	Disabled / Enabled	Enabled
1 ... 8	Fail-Safe	Set low / Set high / Hold last	Set low
1 ... 8	Surveillance Timeout	0 ... 255 ms	80 ms

Channel Diagnostics

The channel-related diagnosis of the module can be enabled (Report) or disabled (Do not report) using this parameter. With channel diagnosis disabled only the device-related and the ID-related diagnosis but no channel-related diagnosis are transmitted. The default is „Enabled“.

Actuator Low Voltage Detection

The diagnosis „Actuator Low Voltage Detection“ can be suppressed using this parameter. Thereby the diagnosis will be suppressed if the module is temporarily used without actuator supply.
This parameter is only provided by modules with digital outputs (16DO, 8DI/DO). The default is "Enabled".

Fail-Safe

This parameter defines the status of the outputs after a communication interruption or failure within the PROFINET-IO network.
The following settings are possible:
- Set low: The output channel will be disabled
- Set high: The output channel will be enabled
- Hold last: The last output status will be hold

This parameter is only provided by modules with digital outputs (16DO, 8DI/DO). The default is „Set low“

Surveillance Timeout

Using this parameter you can define a delay time for the surveillance of output currents. The delay will start after each status change of the output channel, i.e. if it is enabled (rising edge) or disabled (falling edge). The output will be surveilled only after a delay time and then errors (channel, voltage and overload errors) will cause a diagnosis. This avoids pretermed error messages that occur with switching-on capacative loads, with switching-off inductive loads or with other voltage peaks during the status change.
The surveillance timeout can be set from 0 to 255 ms. The default is 80 ms. A timeout of 100 ms is preset for the static status of a channel (permanent on or off).
The timeout can be set individually for each output channel.
This parameter is only provided by modules with digital outputs (16DO, 8DI/DO).

Process data

The PROFIBUS-DP telegram enables the transfer of 244 Bytes user data at maximum.

UR67-PB-78-8DIDO-12-60M									
	Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
					Input data					
Byte n		4B	4A	3B	3A	2B	2A	1B	1A	1A ... 4A: Status input channel A (Pin 4) of M12 sockets 1 ... 4. 1B ... 4B: Status input channel B (Pin 2) of M12 sockets 1 ... 4.
Byte n+1		8B	8A	7B	7A	6B	6A	5B	5A	5A ... 8A: Status output channel A (Pin 4) of M12 sockets 5 ... 8. 5B ... 8B: Status output channel B (Pin 2) of M12 sockets 5 ... 8.
					Output data					
Byte n		8B	8A	7B	7A	6B	6A	5B	5A	5A ... 8A: Specified condition output channel A (Pin 4) of M12 sockets 5 ... 8. 5B ... 8B: Specified condition output channel B (Pin 2) of M12 sockets 5 ... 8.
UR67-PB-78-16DI-12-60M										
	Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
					Input data					
Byte n		4B	4A	3B	3A	2B	2A	1B	1A	1A ... 8A: Status input channel A (Pin 4) of M12 sockets 1 ... 8
Byte n+1		8B	8A	7B	7A	6B	6A	5B	5A	1B ... 8B: Status input channel B (Pin 2) of M12 sockets 1 ... 8
UR67-PB-78-16DO-12-60M										
	Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
					Input data					
Byte n		4B	4A	3B	3A	2B	2A	1B	1A	1A ... 8A: Status output channel A (Pin 4) of M12 sockets 1 ... 8
Byte n+1		8B	8A	7B	7A	6B	6A	5B	5A	1B ... 8B: Status output channel B (Pin 2) of M12 sockets 1 ... 8
					Output data					
Byte n		4B	4A	3B	3A	2B	2A	1B	1A	1A ... 1A: Specified condition output channel A (Pin 4) of M12 sockets 1 ... 8
Byte n+1		8B	8A	7B	7A	6B	6A	5B	5A	1B ... 1B: Specified condition output channel B (Pin 2) of M12 sockets 1 ... 8

Diagnosis / channel errors

Specified value	**Actual value**	**Comment**
Active	Active	OK, no diagnosis
Off	Off	OK, no diagnosis
Active	Off	Channel short circuit indicator is red. The diagnosis „actuator error" is sent. Channel is blocked after fault correction.
Off	Active	Voltage reverse feed-in. Channel indicators red and yellow/white are on. The diagnosis „actuator error" is sent. Channel is not blocked after fault correction.

If both output channels of a M12 socket are enabled during channel error occurance, both channels will be blocked even if only one of them is affected. If only one channel is enabled then only this one will be blocked on channel error.
Blocked channels are being enabled and keep the status "off" unless they are reset and set again by the control.

Voltage error on M12 sockets or sensor short circuit

Contact 1 of each M12 socket contributes the voltage supply with a 24 V potential. This potential is generated from the system/sensor supply U_S and it is monitored.
In case of a sensor short circuit a sensor error is indicated. Both channel indicators of the M12 socket flash red and a diagnosis message for both channels is sent.

Overload of output drivers

The output drivers of the modules with output function will send an error if they recognise an overload.

If both output channels of a M12 socket are enabled during overload occurance, both channels will be blocked even if only one of them is affected. If only one channel is enabled during overload then only this one will be blocked on channel error.
Blocked channels are being enabled and keep the status "off" unless they are reset and set again by the control.

The status indicator of the active ouput channel will flash red in case of overload. If both output channels of a M12 socket are active during an overload both indicator LED will flash red. An actuator error will be sent as diagnosis to the PROFIBUS master.
The overload error can be filtered by the „Surveillance Timeout" parameter. The setting of this parameter also applies to channel, voltage and overload errors.

Error of actuator supply U_L

The voltage values of the actuator supply connections U_L are monitored overall and module-wise. An error will be reported as soon as the value range 18 V ... 30 V is under or overun.
The indicator LED flashes red and an actuator supply error will be sent as a diagnosis to the PROFIBUS master.

In case of an actuator supply error the output channel will be blocked if it was currently enabled. It must be reset by the control as soon as the power supply U_L has normalised.

Error of system/sensor supply U_S

The voltage values of the system/sensor supply connections U_S are monitored overall. An error will be reported as soon as the value range 18 V ... 30 V is under or overun.
The indicator LED U_S flashes red and a sensor supply error will be sent as a diagnosis to the PROFIBUS master.
This error has no effect on the outputs and will not be filtered but reported immediately.

Diagnosis via PROFIBUS-DP

If a UR67 module recognises an error status it will trigger a diagnosis (e.g. with peripheral errors like overload, short circuit, underload).

Evaluation of alarms in STEP7

In STEP7 the application processing is disturbed by triggering a diagnosis and a diagnosis module is called up. The following modules are used:

Reason of alarm	OB called up
Peripheral error (short circuit, overload, line brake, undervoltage of a I/O module)	OB 82
Complete breakdown of the system	OB 86

Due to the called up OB and its start information the first information about failure reason and failure type are already delivered. More detailed information about the failure you will find in error OB 82 by calling up the SystemFunction SFC 13 „DPNRM_DG" (reading diagnosis data of a DP-slave) or the SystemFunctionBlock SFB 54 „RALRM" (reading additional alarm info).
The CPU will change to operation status "STOP" if the called up error OB is not available in the CPU.

Diagnosis

Bit	7	6	5	4	3	2	1	0
Standard diagnosis								
Byte 0	Station status 1							
Byte 1	Station status 2							
Byte 2	Station status 3							
Byte 3	PROFIBUS address (station number) of the master							
Byte 4	High-Byte of the ID number (in this case: 0E)							
Byte 5	Low-Byte of the ID number (in this case: 94)							
Device related diagnosis								
Byte 6	0	0	0	0	0	0	1	0
Byte 7	Module error				Actuator error	Sensor error	Error U_S	Error U_L
With respective error the corresponding error bit will be set in byte 7.								
Channel related diagnosis								
Byte 8	0	1	0	0	0	0	1	0
Byte 9	Socket 8	Socket 7	Socket 6	Socket 5	Socket 4	Socket 3	Socket 2	Socket 1
In case of error on a M12 socket the corresponding error bit will be set.								

	Bit	7	6	5	4	3	2	1	0
Channel related diagnosis									
Byte 10		1	0	0	0	0	0	0	0
Byte 11		Input: 01 Output: 10			Channel number: 0 ... 15 Channel no. 0 = socket 1, channel A Channel no. 1 = socket 1, channel B usw. Channel no 15 = socket 8, channel B				
Byte 12		Channel type: Bit: 001			Error type: Only error type 1 is used.				

Indicating a diagnosis in STEP 7

- ► Choose the affected I/O module in the hardware manager by a mouseclick.
- ► Open the menue "Target system – Component state – DP Slave Diagnosis“

To display the diagnosis in hexadecimal format and display its structure, click the button „Hex View“.

PROFIBUS-DP diagnosis structure

Bit No.	7	6	5	4	3	2	1	0		
Byte 1	0	1	0	0	0	0	1	0		**Station status 1**
								■	1: DP slave cannot be addressed by the DP master	
							■		1: DP slave is not yet ready for data exchange	
						■			1: The project data sent by the master do not match the DP slave configuration	
					■				1: External diangosis present	
				■					1: A required function is not supported by the DP slave	
			■						0: The Bit is always "0"	
		■							1: The DP slave type does not match the software design	
	■								1: The DP slave has been parameterised by another master (not by the one which actually accesses)	
Byte 2	0	1	0	0	0	0	1	0		**Station status 2**
								■	1: The DP slave must be parameterised again	
							■		1: A static diagnosis is pending. The DP slave will only operate again after the failure has been resolved	
						■			1: The Bit is always „1", if the DP slave with this PROFIBUS address is present	
					■				1: The access monitoring is enabled with this DP slave	
				■					1: The DP slave has received the control command „FREEZE"	
			■						0: The DP slave has received the control command „SYNC"	
		■							1: The Bit is always „0"	
	■								1: The DP slave is disabled (it is extracted from the current operation)	
Byte 3	0	1	0	0	0	0	1	0		**Station status 3**
		■	■	■	■	■	■	■	1: The DP slave must be parameterised again.	
	■								1: There are more diagnosis than the DP slave is able to save. The DP master cannot safe all the diagnosis sent by the slave in its diagnosis buffer.	
Byte 4	255									**Master address**
Byte 5	High-Byte									**Vendor-ID**
Byte 6	Low-Byte									
Byte 7	0	1	0	0	0	0	1	0		**ID related diagnosis**
							■	■	Length (2 Byte)	
	■	■							Header	
Byte 8	0	1	0	0	0	0	1	0		
								■	Socket 1 peripheral error	
							■		Socket 2 peripheral error	
						■			Socket 3 peripheral error	
		▨	▨	▨	▨				...	
	■								Socket 8 peripheral error	
Byte 9	0	0	0	0	0	0	1	0		**Device related diagnosis**
							■	■	Length (2 Byte)	
	■	■							Header	
Byte 10	0	1	0	0	0	0	1	0		
								■		
							■		Sensor undervoltage	
						■			Sensor short circuit	
					■				Actuator short circuit	
	■								Module error	

5 Installation

WARNING

Dangerous contact voltage!

- ► Carry out assembly and wiring work on the u-remote station only when the power supply is disconnected.
- ► Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply!

5.1 Preparations for assembly

Make sure that the permitted environmental conditions for installation and operation are observed (see technical data). The installation ground must be even and plain.

Installation position and dimensions

The modules with plastic housing (**A, B**) can be installed either laying flat or lateral upright. The modules with metal housing (**C**) must be installed laying plain. You will find the installation dimensions as well as the tightening torques in the mounting drawings on the following pages.

Unpacking the delivery

- ► Please check the delivery for completeness and transport damage.
- ► Please report any transport damage immediately to the respective transport company.

ATTENTION

The product can be destroyed by electrostatic discharge!

The components in the u-remote series can be destroyed by electrostatic discharge.

- ► Please make sure that personnel and work equipment are adequately earthed!

- ► Unpack all parts.
- ► Dispose of all packaging in accordance with the local disposal guidelines. The cardboard packaging can be sent for paper recycling.

5.2 Assembling the module and earthing connection

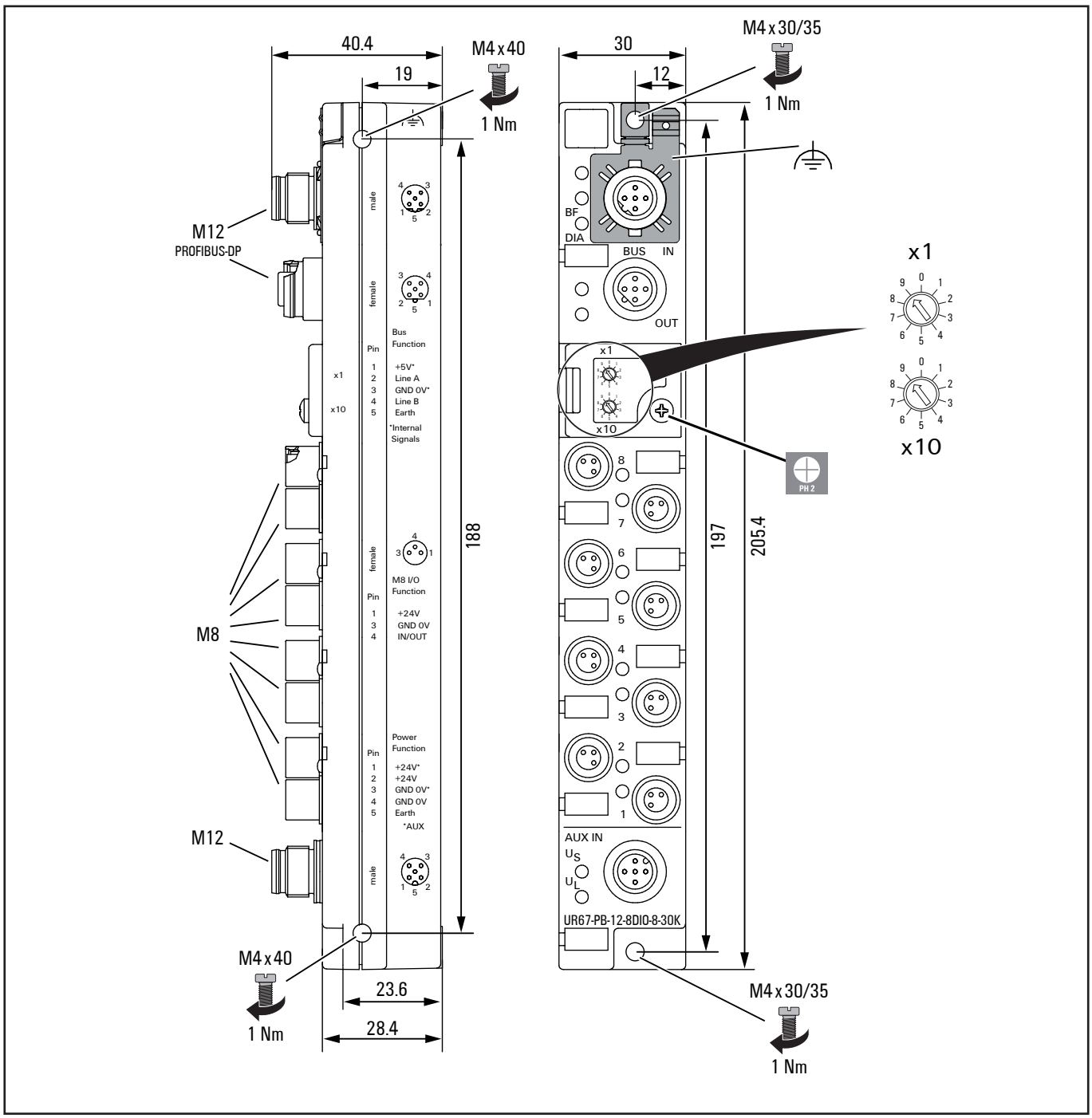
- ► Drill the assembling holes (drilling dimensions see mounting drawings on the following pages).
- ► Adjust each module using at least two screws with grommets (according to DIN 125).
- ► Please regard the noted screw dimensions and tightening torques.

Element	Tightening torque
M8 plug connector	0.3 Nm
M8 protection cap	0.3 Nm
M12 plug connector	0.6 Nm
M12 protection cap	0.6 Nm
Lock of the clear cover (rotary switches)	0.5 Nm

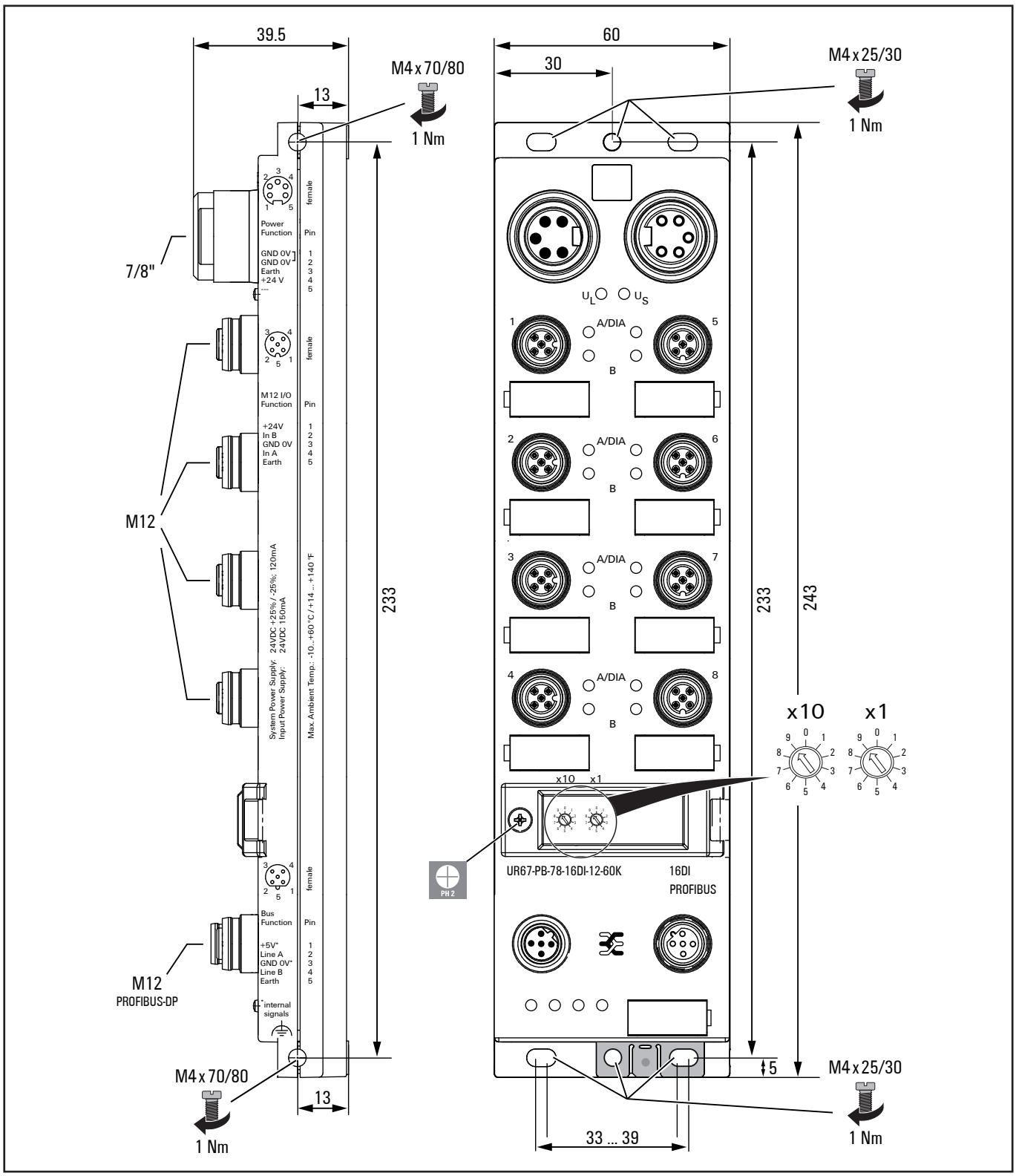
The module must be earthed in order to discharge disturbance currances and for the EMC stability.

- ► Connect the earthing clamp (**A, B**) or the earthing connector (**C**) with ground using a low impedant connection.

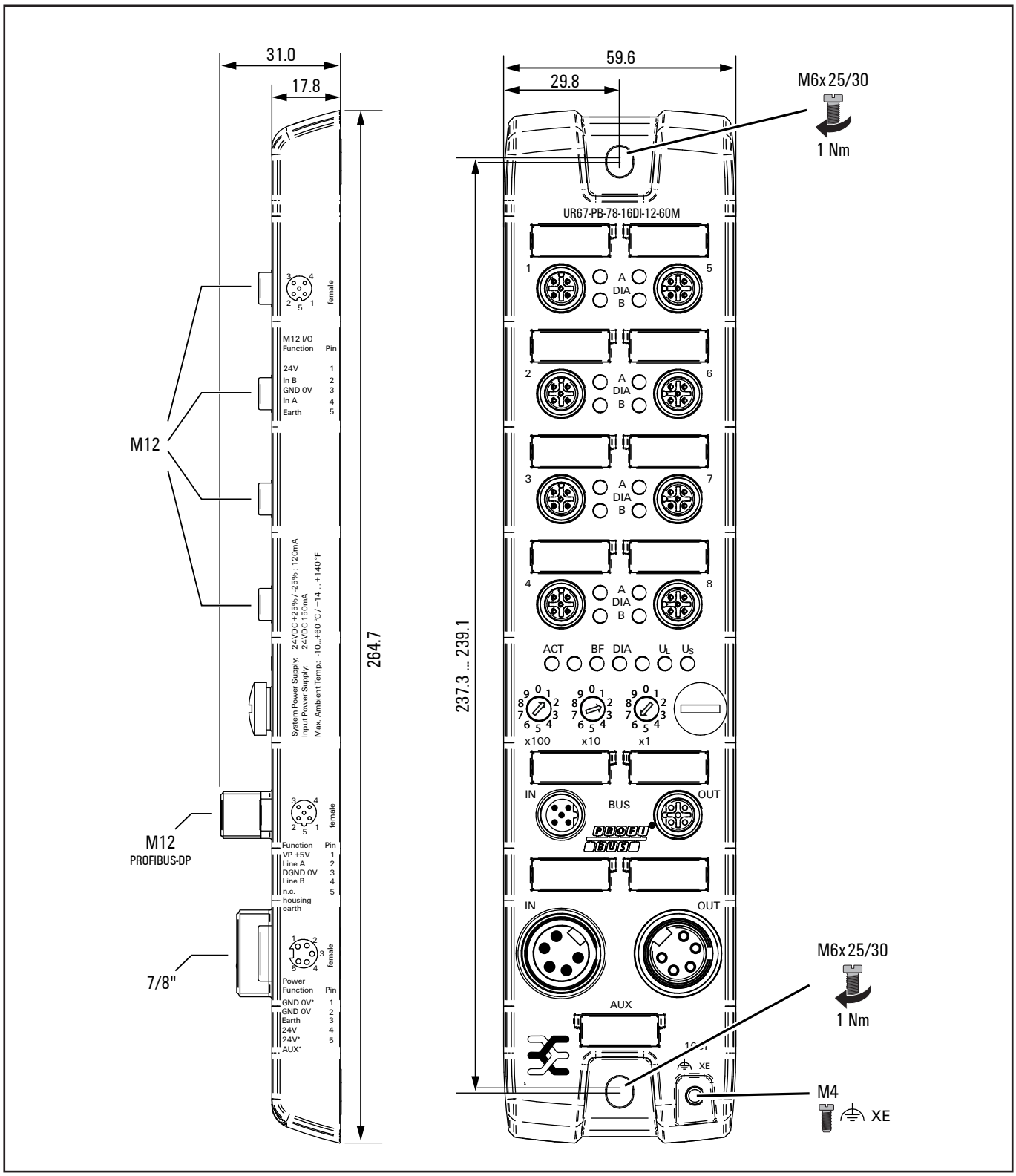
In case the mounting ground is earthed you can realise the connection directly using a mounting screw (not possible with lateral mounting). If the mounting ground is not earthed or with lateral mounting please use a earthing strap or an appropriate line!



Mounting dimensions UR67-PB-12-8DI-8-30K (2426360000), UR67-PB-12-8DIO-8-30K (2426330000)



Mounting dimensions UR67-PB-78-16DI-12-60K (2426370000), UR67-PB-78-16DIO-12-60K (2426340000)



Mounting dimensions UR67-PB-78-8DIDO-12-60M (2426380000), UR67-PB-78-16DI-12-60M (2426390000), UR67-PB-78-16DO-12-60M (2426400000)

5.3 Attaching the markers

Attaching connection markers

The module as well as the connections can be labelled using the markers. This ensures clear allocation even on maintenance work.

- ► Press the labelled marker into the corresponding fixture.
- ► For reversal lever out the marker carefully using a screw driver (2.5 or 3 mm).

5.4 Adjusting the PROFIBUS address

You will find the description how to adjust the address in the respective module description (see Chapter 4).

5.5 Wiring

WARNUNG

Dangerous contact voltage!

- ► Carry out assembly and wiring work only when the power supply is disconnected.
- ► Make sure that the place of installation has been disconnected from the power supply!

Once the module has been mechanically installed, the wiring can be carried out in accordance with the wiring plan.

Ensure compliance with the minimum permissible cable bending radius.

5.6 Insulation test

Insulation tests have to be done according to the national regulations, in any case necessarily before each commissioning.

ACHTUNG

The product can be destroyed by too high test voltage!

Please note during insulation test:

- – within one channel the test voltage between 24 V and GND must not exceed 30 V!*
- – A maximum test voltage of 500 V can be applied tho all other connection points.

* We recommend to short-circuit 24 V and GND on the supply connector.

6 Earthing and shielding

6.1 Earthing of shielded cables

Electrical and electronic systems must be designed such that they are largely safeguarded against electrical interference, thus enabling them to operate securely even in the case of transient interference voltages.

Electrical interference can be introduced into electric circuits in a variety of ways. The most frequent causes are due to inductive interference. In addition, galvanic and capacitive coupling as well as electrical fields and other processes are causes for interference voltages. Here, high-frequency voltage fluctuations – known as transients – are the cause of interference with a high level of effectiveness.

Shielded cables increase interference resistance

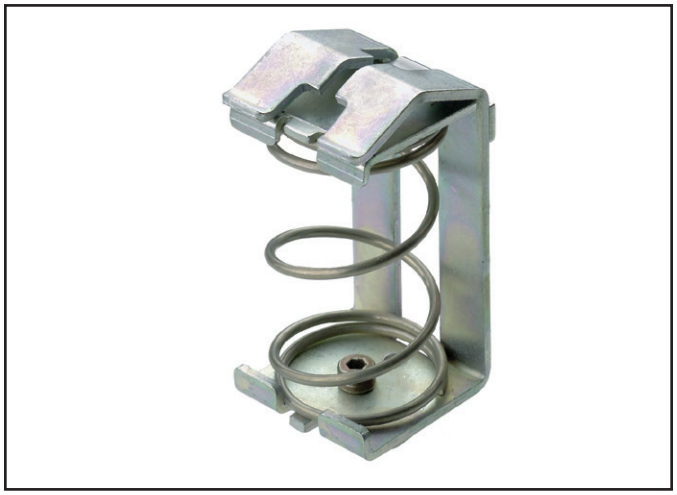
The sources of interference voltages can rarely be eliminated and even then not always completely. Thus, it is necessary to take measures to combat their effect. In general, the more effectively interference voltages can be kept away from circuit elements or can be discharged, the less electrical circuits are affected. This can be accomplished in a variety of ways with varying levels of effectiveness. A very effective measure, in particular for safeguarding against inductive effects, i.e. ensuring "electromagnetic compatibility" (EMC), is the shielding of electrically functional components to earth potential. In doing so, for instance, components are installed in metallic, earthed housings and the connecting lines are equipped with shielding.

In general, it can be said that interference from cables can be combated by routing cables as far away as possible from each other, keeping the common return as short as possible and using twisted-pair wire. Far better protection, however, is provided by completely shielding of all cables. This is the most effective measure that can be taken against the coupling of interference signals.

The best type of shielding consists of a braided mesh sleeve that uses individual wires made of non-magnetic materials (copper, aluminium). The braided mesh should be sufficiently large and also be as thick as possible. For cables that are equipped with foil shields, it is necessary to be aware of the low mechanical strength and the low current-carrying capacity of the shielding.

Proper use of shielded cables

The shielding of cables will only result in the desired effect if this is implemented properly. Incorrect earthing or the use of improper components that perform their task inadequately reduces or even totally eliminates the effect. Placing the shielding at any spot on the earth potential will not suffice, as this earth connection may have no effect on high frequencies. In addition, ground loops must also be taken into consideration. Furthermore, the shielding should be earthed over a large surface area. Beyond that, the quality of the shield conductor and earthing accessories is also important.



Weidmüller clamping bracket KLBUE 10-20 SC (Order No. 1712321001)

In practice, the shield is still often twisted and connected to a terminal point. There is very high attenuation (voltage drop) on these connections, especially for high-frequency interference. Therefore, this type of shielding should not be used, even for short cable lengths. The shielding of the cable is practically negated and can, at best, be helpful for low-frequency interference. We recommend that there is a large amount of surface contact with the braided shield of the cable.

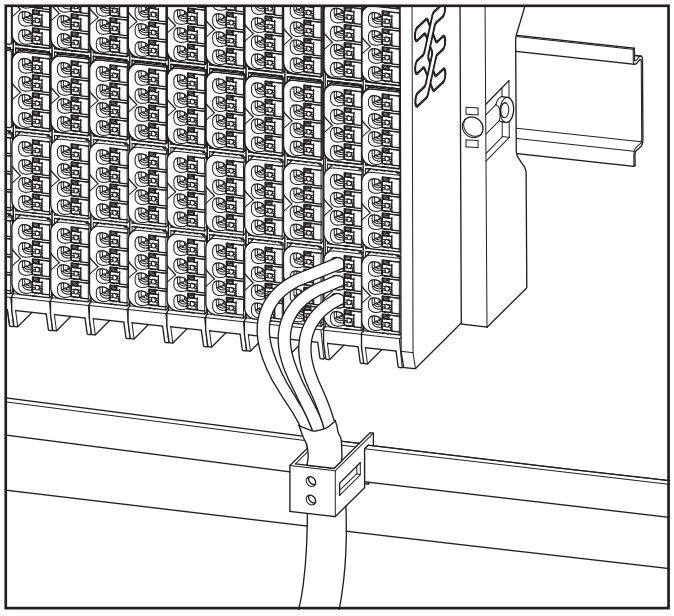
There are generally four distinct types of coupling:

- Galvanic coupling
- Capacitive coupling
- Inductive coupling
- Radiation coupling

These types of interference usually occur mixed together, but they can be categorised as follows:

- Electromagnetic fields
- Ripple voltage (50 Hz)
- Lightning
- Interference pulses (current, voltage)
- Transient surge voltages
- Radio interference
- ESD (electrostatic discharge)
- Burst
- Mains feedback

Another area of concern as regards shield contact is the “flow” within the conductor. Temperature changes caused by the current lead to changes in the conductor cross-section. A rigid contact can therefore only be partially effective. A self-adjusting contact is what is really required. Weidmüller's clamping bracket products (KLBÜ series) provide the perfect solution to meet this challenge.



Use of a clamping bracket

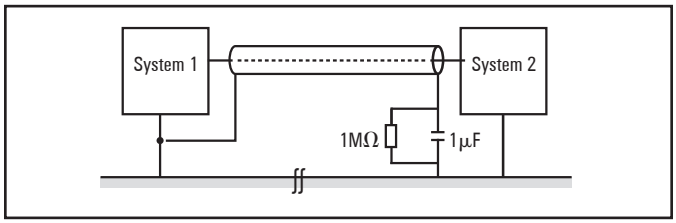
Effective shielding

It is important that the shielding is not positioned on the earth of the connected component, but on the protective earth. In the case of components that are installed in a metal housing, the shielding must be positioned to this housing. If no earthed housing is available, the shielding is positioned on a separate earth.

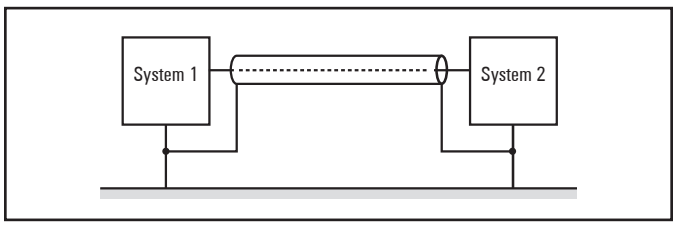
When installing ground connections on shielding, it is generally also important that no earth loops are created. The smaller the earth loop, the less the danger of the induction of interference voltages. It is therefore most suitable to have a purely neutral-point installation.

The following sketches show the possible shielding connections to protective earth.

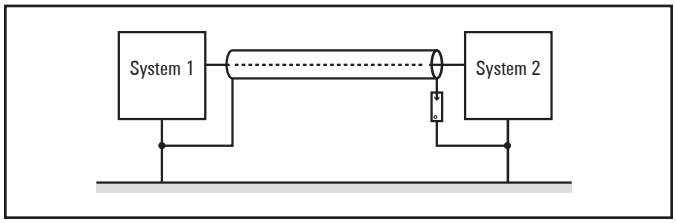
A one-sided connection of the shielding protects against capacitive coupling of interference voltages.



If you use a two-sided shielding connection, make sure that compensating current (different earth potentials) does not flow through the cable shield.



If you wish to avoid the disadvantages associated with creating an earth loop with two-sided shields, it is recommended you connect one side of the shield through a high impedance.

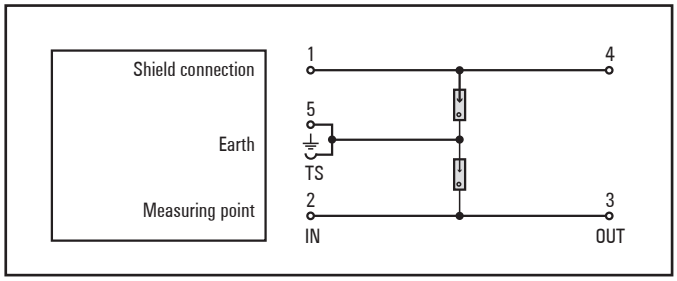


For longer lengths of shielded cables, such as if a sensor must be added to a control panel, a potential difference between both end points must not be ignored.

However, such shield conductors are relatively expensive and also require more time in working with them. Another possibility would be to place an additional voltage equalising cable between the measurement location and the control panel. The shield can then be hooked up on both sides.

A high-impedance earth connection is also another option. In the control panel, the shield is then connected to the earth potential, and the shield has a high-impedance connection to earth at the measurement location via a gas discharge tube. This solves the problem of a potential transfer and 50-Hz humming.

For non-isolated measurement locations, two gas discharge tubes must be installed. One connects the shield to earth, and the other connects it to the non-isolated measurement location. This method prevents a galvanic coupling between the measurement circuit and the earthed measurement location.



Summary

Earthing is a key element for the reliable functioning of an electrical system in the event of interference. In this regard, HF-related aspects must be taken into consideration. Only the proper use of materials and a well thought-out circuit design will lead to success.

6.2 Potential ratios

The reference potentials of system/input supply and output supply are galvanically isolated from each other.

6.3 Electromagnetic compatibility (EMC)

u-remote products completely meet EMC requirements. EMC planning, however, is necessary prior to installation.
Aspects to consider include all potential interference sources such as galvanic, inductive and capacitive couplings, as well as radiation couplings.

Ensuring EMC

To ensure EMC, the following basic principles must be observed during installation of the u-remote modules:

- Proper, extensive earthing of inactive metal parts
- Correct shielding of cables and equipment
- Proper layout of wires – cabling
- Creation of a uniform reference potential and earthing of all electrical equipment
- Special EMC measures for special applications (e.g. frequency converters, servo drives)
- Contactors and relay coils must be equipped with the corresponding interference suppressors.
- Devices and function units with higher interferance potential have to be capsuled if necessary.

Earthing of inactive metal parts

The earthing of all inactive metal parts reduces the influence of coupled interference. For this purpose, all inactive metal parts (such as switch cabinets, cabinet doors, support beams, mounting plates, DIN rails, etc.) must be connected to each other over a large surface area with low impedance, whereby a uniform reference potential is ensured for all control unit elements.

Required measures:

- Removal of the insulating layer around screw connections. Protection of connection points against corrosion
- Connection of moving earthed components (cabinet doors, separated mounting plates, etc.) through short earthing straps with large surfaces
- When possible, avoid using aluminium parts, because aluminium oxidises easily and in this respect is unsuited for earthing

PE connection

The connection from earth to the PE (protective earth) connection must be done centrally.

WARNING

Possible danger to life!
In the event of a fault, the earth must never take on a dangerous contact voltage, which is why it must be connected to a PE conductor.

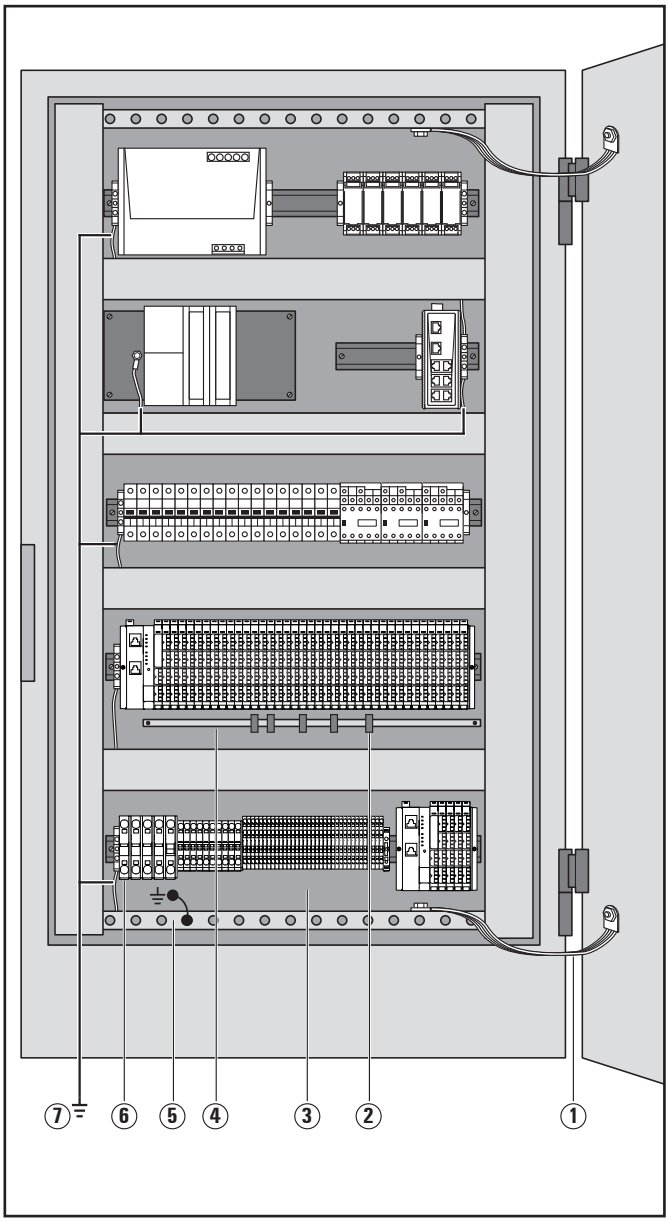
Unearthed operation

In the event of unearthed operation, the corresponding safety regulations must be observed.

Sensor and actuator lines

To avoid antenna effects caused by looped lines, all lines that go to a certain sensor or actuator should be combined in one cable.

Cabinet design according to EMC guideline:



1 Earthing strips
Earthing strips must be used for connecting inactive metal parts if it is not possible to connect two large pieces of metal. Use short earthing strips with large surfaces.

2 Clamping bracket for signal cables
If shielded signal cables are used, the shield must be attached to the clamping bracket (KLBÜ series) on the busbar over a large surface. The braided shield must cover and make good contact with a large part of the clamping bracket.

3 Mounting plate
The support beam for holding control components must be connected to a large part of the cabinet housing.

4 Busbar
The busbar must be connected via the rail holding fixture. The cable shields are fixed to the busbar.

5 Protective earth conductor rail
The protective earth conductor rail must likewise be attached to a large part of the mounting plate, and it must be connected to the protective earth conductor system via an external cable with a cross-section of at least 10 mm^2, in order to discharge interference current.

6 Protective earth terminal strip
The protective earth terminal strip must be connected to the protective earth conductor rail in a neutral-point configuration.

7 Cable to protective conductor system (earthing point)
The cable must be connected to a large part of the protective conductor system.

See also:
EMC Directive 2014/30/EU

6.4 Shielding of cables

To prevent the coupling of interference voltages and the decoupling of interference fields in cables, only shielded cables made from well-conducting material (copper or aluminium) with braided shielding and a coverage of at least 80 % should be used in the design of a cable shield.

Only when a cable shield is connected to the local reference potential on both sides is it possible to achieve optimal shielding against electric and magnetic fields. Exceptions are possible, for example, with high-impedance, symmetrical or analogue signal cables. If a shield is attached on only one side, this merely achieves an isolation against electric fields.

ATTENTION

Material damage!
Requirements for effective shielding design:
- The shield connection to the shield bus should be low impedance
- The shield must be connected directly at its entrance into the system
- Keep cable ends as short as possible
- Do not use cable shields for equipotential bonding

When connecting a data cable using a sub-D connector, the connection must be made through the connector's shield collar and never through pin 1.
The data cable's shield must be attached to the shield bus with the insulation stripped away. The shield is to be connected and attached with clamping brackets or similar metal fixing devices. The shield bus must be connected to the reference potential surface through a low impedance (e.g. fastening point with a separation of 10 to 20 cm). The brackets must surround and make contact with a large part of the shield.
Isolation of the cable shield should be avoided. Instead, it should be routed into the system (for example, the switch cabinet) up to the interface connection.

ATTENTION

Shielding of field bus cables
When shielding field-bus cables, the installation guidelines for the respective field buses must be observed. (See the websites of the field bus organisations.)

Material damage!
If it is only possible to have a one-sided shield connection for reasons specific to the circuit or equipment, the second side of the cable shield can be routed to the local reference potential via a capacitor (with short connections). To prevent disruptive discharges when interference pulses occur, a varistor or a resistor can also be wired in parallel to the capacitor.
As an alternative, a doubled version (galvanically isolated) can be used, whereby the inner shield is connected on one side and the outside shield is connected on both sides.

Equipotential bonding

If system components are positioned separately from each other, potential differences may arise, provided that:

- Power is provided from different sources
- The earthing is implemented at different system parts, despite the cable shields being connected at both sides

A voltage equalising cable must be used for equipotential bonding.

WARNING

Possible danger to life!
The shield must not be used for equipotential bonding!

The following features are essential for a voltage equalising cable:

- In the case of cable shields on both ends, the impedance of the equalising cable must be considerably smaller than that of the shield connection (maximum 10 % of its impedance)
- When the length of the equalising cable is less than 200 m, its cross-section must be at least 16 mm^2 If the cable is greater than 200 m in length, a cross-section of at least 25 mm^2 is necessary.
- Large-surface connection with the PE conductor or the earthing and corrosion protection are requirements for long-term safe operation
- They must be made of copper or galvanised steel
- In order to keep the enclosed area as small as possible, the equalising cable and signal cable must be routed as close to each other as possible

Wiring of inductances

In case of inductive loads we recommend a suppressor circuit directly on the load. The ground (PE/FE) must be positioned star-shaped according to the standards.

7 Commissioning

WARNING!

Manipulation of the control unit!
During commissioning, the system may be manipulated to such an extent that can result in risks to life and material damage.
► Make sure that system components cannot start up unintentionally!

The procedures applied during commissioning depend on which control unit is being used on site. The descriptions in this chapter use commissioning with the Siemens SIMATIC Manager Step7 (from V5.5 SP2 on) as an example.

7.1 Requirements

Before you start the commissioning work, the following requirements must be fulfilled.
– The control unit must be in operation.
– The UR67 modules must be completely assembled and wired up.
– The control unit and the UR67 modules must be connected via fieldbus, and a PC/laptop must also be connected.
– The power supply must be turned on.

7.2 Device description files

Downloading and installing files

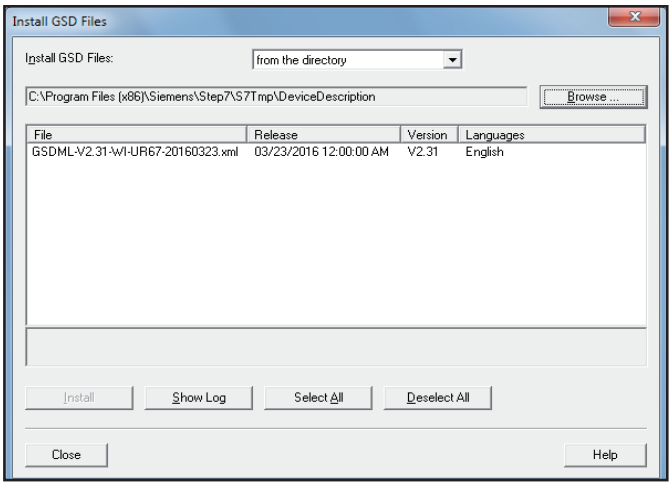
► Download the device description files from the Weidmüller website.

Module	GSD file
Plastic housing, 30 mm wide (**A**): UR67-PB-12-8DI-8-30K, UR67-PB-12-8DIO-8-30K	WIUR09C9.GSD
Plastic housing, 60 mm wide (**B**): UR67-PB-78-16DI-12-60K, UR67-PB-78-16DIO-12-60K	WIUR09CA.GSD
Metal housing (zinc diecast) completely potted, 60 mm wide (**C**): (UR67-PB-78-8DIDO-12-60M), UR67-PB-78-16DI-12-60M, UR67-PB-78-16DO-12-60M	WIUR0E94.GSD

► If bitmap files for visualising the modules are also supplied, store them in the same folder as the device description files.

Projects must not be open in the hardware configuration tool while the files are being installed!
► Close any open projects before installing the device description files!

► In the hardware configuration tool, open: **Extras/Install GSD files**.
► Select the directory in which you have stored the device description files.
The files available are displayed.



Selecting GSD file

► Select the files that you would like to install.
► Click **Install**.
► When the installation is complete, click **Close**.
► Update the device catalogue via **Extras/Update catalogue**.
The devices associated with the current device description file are now listed in the device catalogue.

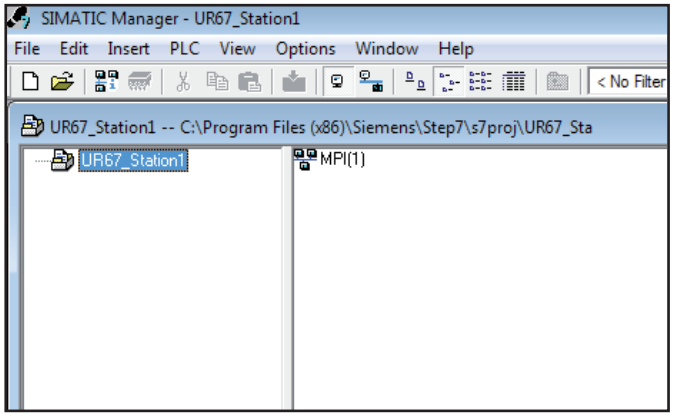
Updating device description files

The naming convention for GSD files always follows this pattern: GSDML_V2.31-WI-UR67-20160323.xml. By reading off the version (V2.31) and the date (2016/03/23), you can find out the status of a GSD file and determine whether you are already using the latest version.

► Download the latest GSD files from the Weidmüller website.

7.3 Commissioning the UR67 module

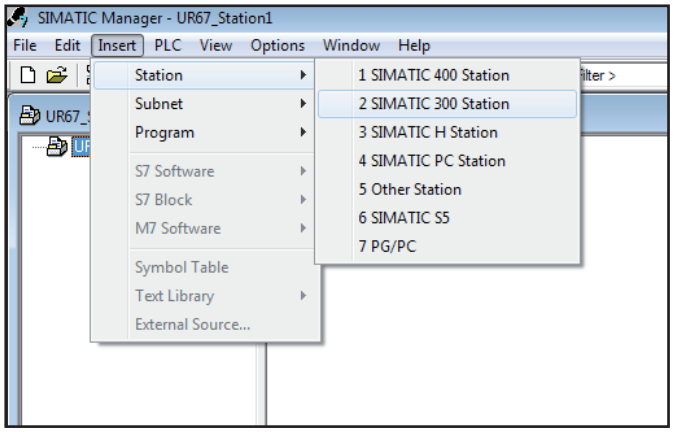
► Start the SIMATIC Manager.
► To set up a new project, click **File/New**.
The "New Project" window opens.
► Enter a name for the new project (e.g. UR67_Station1) and click **OK**.
The new project is displayed in SIMATIC Manager.



Creating a new project

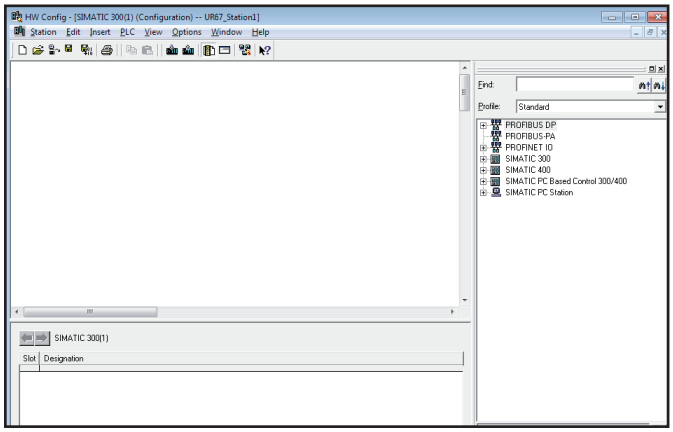
Adding a control unit type

► Select the project in SIMATIC Manager.
► Select the control unit type VIA **Insert/Station** (e.g. SIMATIC 300).



Adding a station

► Double-click on the project name so that the station (SIMATIC 300) is displayed below in the directory tree.
► Click on the station (SIMATIC 300).
► Double-click **Hardware** on the right-hand side of the window.
The "Hardware Configuration" window opens.

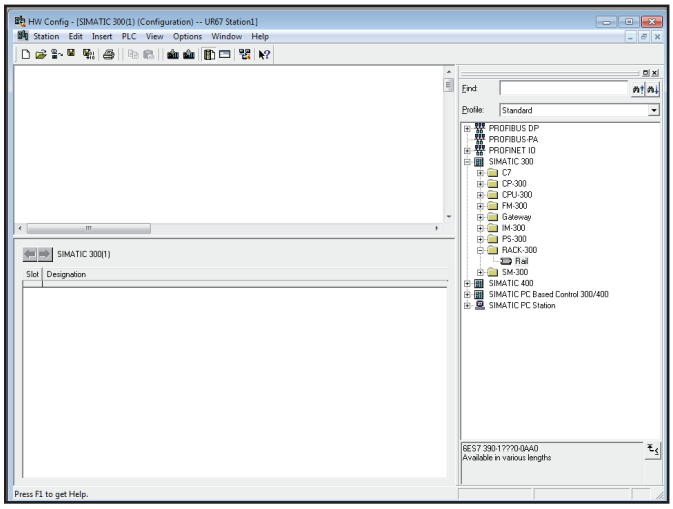


Hardware configuration

► The device catalogue is displayed on the right-hand side of this window. If this does not occur, open the catalogue via **View/Catalogue**.

Adding a profile rail

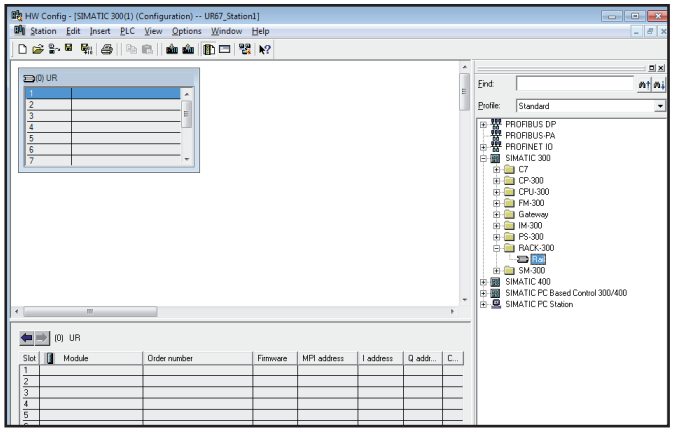
► In the catalogue, choose the profile rail (e.g. SIMATIC 300/RACK-300).



Choosing a profile rail

► Double-click on the profile rail or drag it to the left-hand side of the window using the mouse.

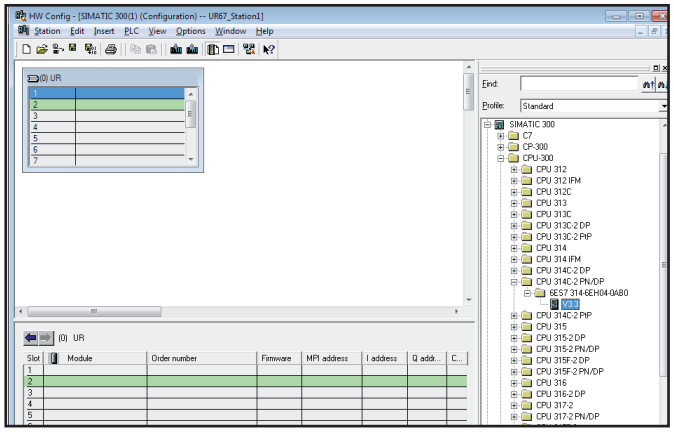
The profile rail (UR) is displayed with the open positions.



Profile rail with open positions

Selecting the control unit version

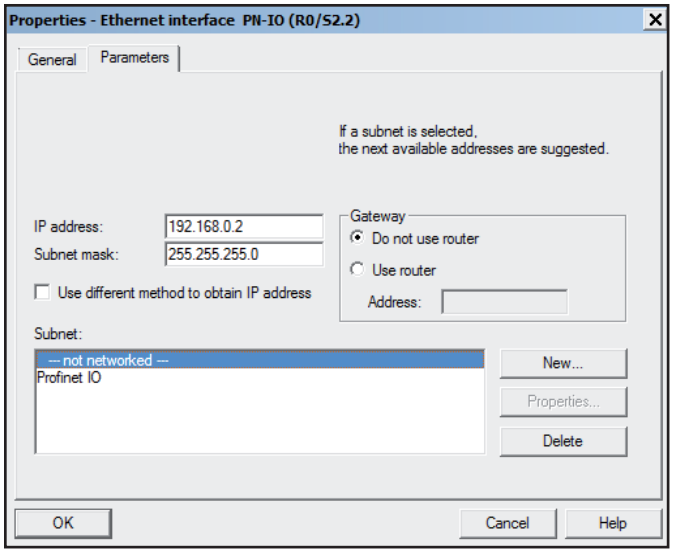
► Click on the second line of the **UR** table.
► From the catalogue, select the control unit in use and its version (inscription on the control unit, e.g. 314-GEH04-...).



Selecting the control unit version

► Double-click on the respective version, or use the mouse to drag it to the second position in the table on the left-hand side of the window.

The **Properties Ethernet interface** window opens.



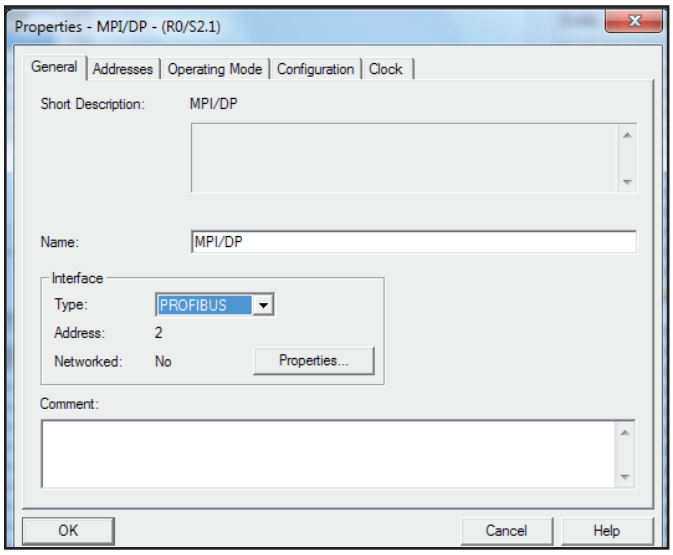
Ethernet interface properties

► Enter the designated IP address and the subnet mask.
► Confirm with **OK**.

Adding a PROFIBUS network

► Double-click on the MPI/DP interface to create the PROFIBUS network.

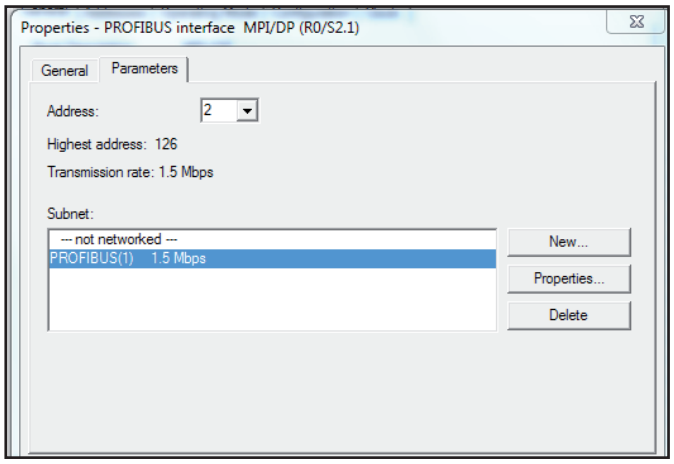
The **MPI/DP properties** window opens.



Properties MPI/DP

► Choose "**Profibus**" as interface type.

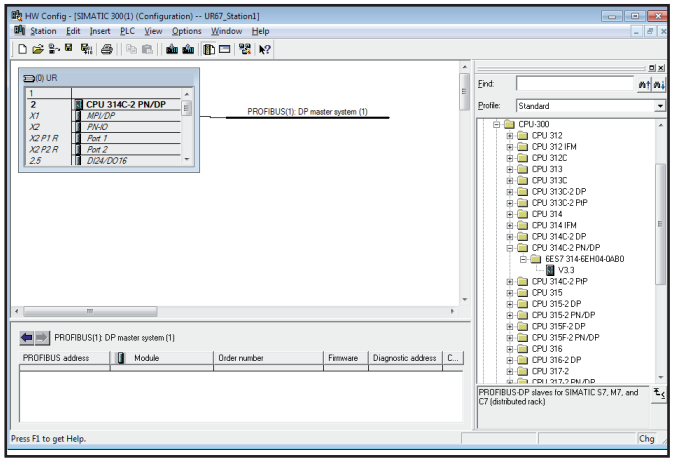
► In case the **Properties PROFIBUS interface** window will not open automatically please click on "**Properties**".



Properties PROFIBUS interface MPI/DP

► Click on **New**.
► Enter a name for the subnet.
► Confirm **three times** by clicking **OK**.

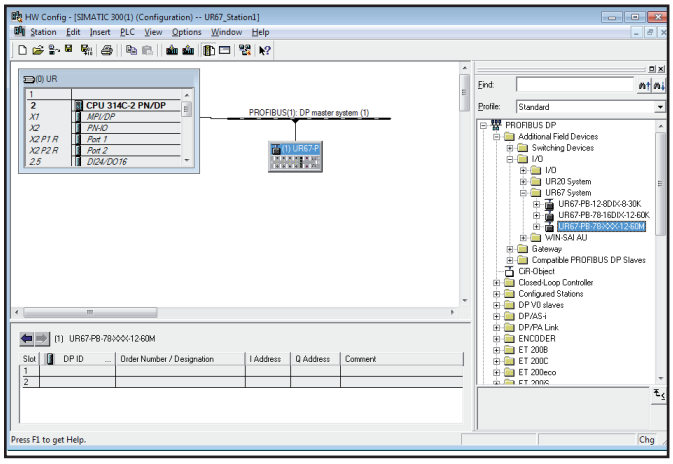
A network line which has the subnet name is now displayed in the configuration window.



PROFIBUS configuration

Linking a module

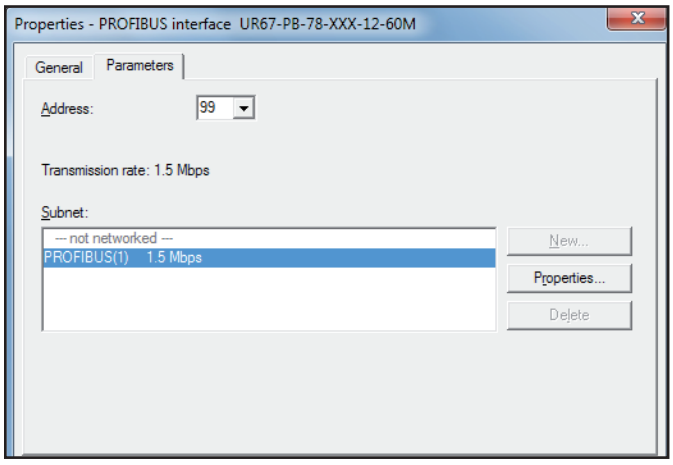
► Click on the network line in the configuration window.
► In the device catalogue under **PROFIBUS IO/Additional field devices/ I/O /UR67 system** open the module line from which you want to add a module (e.g. UR67-PB-78-XXX-12-60M).



Choosing the module

► Double-click on the designated module line or drag it exactly to the subnet line.

The module line is added to the subnet and the window "**Properties PROFIBUS interface**" for this module line opens.



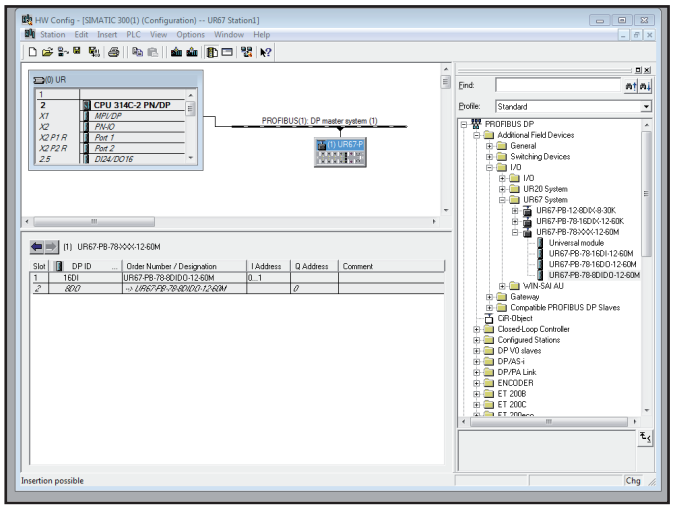
Adjusting the PROFIBUS address

► Choose the address which is adjusted on the module (rotary switches) and confirm with **OK**.

Each PROFIBUS address must only be set once!

All settings only take effect once they have been loaded into the component/control unit (see below).

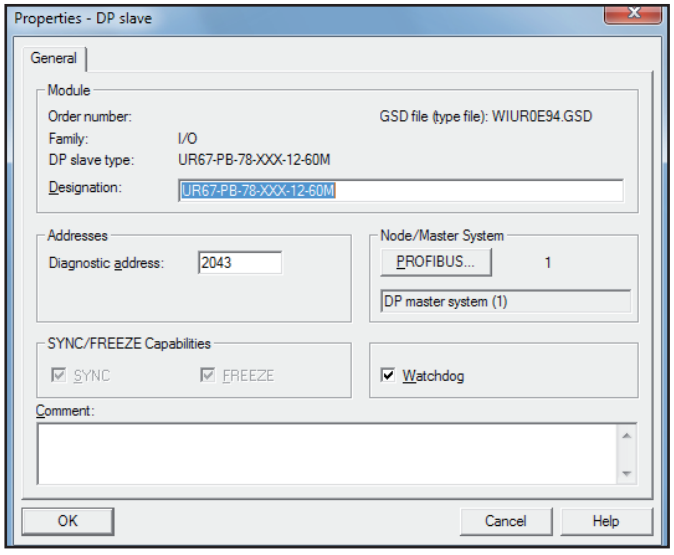
► Click on the first slot in the component list of the former added module line.
► In the device catalogue choose the respective module of the module line.
► Double-click on the module or plug it into the list.



Module added

Changing the device designation

► Double-click on the module icon.
The **DP-Slave properties** window opens.



Module properties

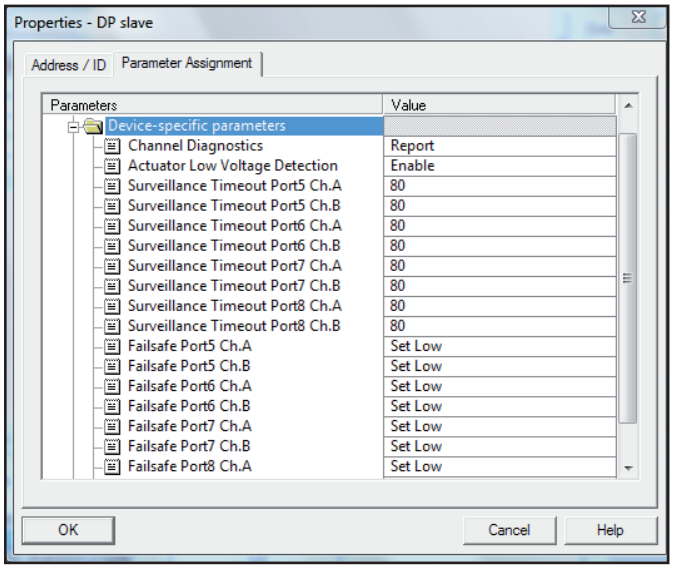
► If needed change the **desingation** and confirm with **OK**.

Removing a module

► To delete a module from the list, select the module and click **Edit/Delete**.
or
► Using the right mouse button, click on the module in the list and select **Delete**.

Setting module parameters

A wide range of parameters can be edited for some modules.
► Navigate to the list of components and double-click on the module.
The **Parameters - Module XY** window opens.
► Select the **Parameters** tab.
The list of alle parameters of the module is displayed.



Editing module parameters

► Click on the parameter that you would like to change and amend the setting as required.
► Use this method to edit all of the parameters that you would like to change.
► Save the settings by clicking on **OK**.

8 Disassembly and disposal

8.1 Disassembling the u-remote modules

- ► Remove all cables and lines.
- ► Unfasten the mounting screws of the module.
- ► Please observe the instructions for proper disposal.

8.2 Disposing of the u-remote module

ATTENTION

Products in the u-remote series are subject to WEEE (EU Directive 2012/19/EU), which regulates the collection and recycling of electrical and electronic equipment.

- ► Make sure that disassembled products are properly disposed of!

When all u-remote products reach the end of their life cycle, you can return them to Weidmüller, and we will arrange for their proper disposal. This also applies to countries outside the European Union.

- ► Please pack the products properly and send them to your responsible distributor.

You can find the address of your respective country representative in the annex and at the Weidmüller website.

9 LED indicators and troubleshooting

In the event of a malfunction occurring on a u-remote product, carry out the following recommended measures. If the malfunction cannot be fixed, send the affected product to Weidmüller. All addresses as well as your local Weidmüller partner can be found on our Website.

Weidmüller does not assume any liability If the base or electronic module has been tampered with!

Technical support:
Tel. +49 5231 14-292828
support-electronics@weidmueller.de

Module	LED	Status	Recommended action
2426360000, 2426330000			
	BF	**Red**: Fieldbus error, no communication **Off**: No error	– **Red**: Check the fieldbus cable and the PLC configuration, check whether the GSD file is up-to-date
	DIA	**Red**: Collection error for peripheral errors **Off**: No error message present	– **Red**: Check, on which channel the connected device causes an error. At least one channel LED must also shine.
	US	**Green**: Sensor-/system supply OK **Red**: Sensor-/system supply < 18 V or > 30 V **Off**: No sensor-/system supply	– **Red**: Check the power supply of the module
	UL	**Green**: Actuator supply OK **Red**: Actuator supply < 18 V or > 30 V **Off**: No actuator supply	– **Red**: Check the power supply of the module
	1 ... 8 Channel status	**Yellow**: Channel A "On" **Red**: Peripheral error (actuator low voltage, sensor or actuator short circuit) **Off**: Not connected, status "Off", no error	– **Red**: Check the connected periphery for short circuit, check the power supply of the peripheral device
2426370000, 2426340000			
	BF	**Red**: Fieldbus error, no communication **Off**: No error	– **Red**: Check the fieldbus cable and the PLC configuration, check whether the GSD file is up-to-date
	DIA	**Red**: Collection error for peripheral errors **Off**: No error message present	– **Red**: Check, on which channel the connected device causes an error. At least one channel LED must also shine.
	US	**Green**: Sensor-/system supply OK **Red**: Sensor-/system supply < 18 V or > 30 V **Off**: No sensor-/system supply	– **Red**: Check the power supply of the module
	UL	**Green**: Actuator supply OK **Red**: Actuator supply < 18 V or > 30 V **Off**: No actuator supply	– **Red**: Check the power supply of the module
	1 ... 8 A Status Channel	**Yellow**: Channel A "On" **Red**: Peripheral error (actuator low voltage, sensor or actuator short circuit) **Off**: Not connected, status „Off“, no error	– **Red**: Check the connected periphery for short circuit, check the power supply of the peripheral device
	1 ... 8 B Status Channel	**Yellow**: Channel B „On“ **Red**: Peripheral error (actuator low voltage, sensor or actuator short circuit) **Off**: Not connected, status „Off“, no error	– **Red**: Check the connected periphery for short circuit, check the power supply of the peripheral device

Module	LED	Status	Recommended action
2426390000, 2426380000, 2426400000			
	BF	**Red**: Fieldbus error, no communication **Off**: No error	– **Red**: Check the fieldbus cable and the PLC configuration, check whether the GSD file is up-to-date
	DIA	**Red**: Collection error for peripheral errors **Off**: No error message present	– **Red**: Check, on which channel the connected device causes an error. At least one channel LED must also shine.
	US	**Green**: Sensor-/system supply OK **Red**: Sensor-/system supply < 18 V or > 30 V **Off**: No sensor-/system supply	– **Red**: Check the power supply of the module
	UL	**Green**: Actuator supply OK **Red**: Actuator supply < 18 V or > 30 V **Off**: No actuator supply	– **Red**: Check the power supply of the module
	ACT	**Yellow**: Data exchange with PROFIBUS master **Off**: No connection	– **Off**: Check the fieldbus connection
	1 ... 8 A Status Channel	**Yellow**: Channel A "On" **Red**: Peripheral error (actuator low voltage, sensor or actuator short circuit) **Off**: Not connected, status „Off“, no error	– **Red**: Check the connected periphery for short circuit, check the power supply of the peripheral device
	1 ... 8 B Status Channel	**Yellow**: Channel B „On“ **Red**: Peripheral error (actuator low voltage, sensor or actuator short circuit) **Off**: Not connected, status „Off“, no error	– **Red**: Check the connected periphery for short circuit, check the power supply of the peripheral device

Weidmüller – Your Partner in Industrial Connectivity

As experienced experts we support our customers and partners around the world with products, solutions and services in the industrial environment of power, signal and data. We are at home in their industries and markets and know the technological challenges of tomorrow. We are therefore continuously developing innovative, sustainable and useful solutions for their individual needs. Together we set standards in Industrial Connectivity.

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 16
D-32758 Detmold
T +49 5231 14-0
F +49 5231 14-292083
info@weidmueller.com
www.weidmueller.com

Your local Weidmüller partner can be found on our website:
www.weidmueller.com/countries

Order No. 2484950000/00/03.2016