SIEMENS

SIMATIC NET

Industrial Wireless LAN SCALANCE W788-xPRO/RR / W74x-1PRO/RR

Operating Instructions

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07/2014

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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⚠WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

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indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Information on the Internet

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Introduction 2

2.1 Information on the Operating Instructions

Validity of the Operating Instructions

These operating instructions cover the following products:

- SCALANCE W788-1PRO
- SCALANCE W788-2PRO
- SCALANCE W788-1RR
- SCALANCE W788-2RR
- SCALANCE W744-1PRO
- SCALANCE W746-1PRO
- SCALANCE W747-1RR

These operating instructions apply to the following software version:

- SCALANCE W788-xPRO/RR or W74x-1PRO/RR with firmware as of version 4.4

Purpose of the Operating Instructions

Based on the Operating Instructions, you will be able to install and connect up the SCALANCE W788-xPRO/RR or W74x-1PRO/RR correctly. The configuration and the integration of the device in a WLAN are not described in these instructions.

Documentation on the accompanying CD

You will find detailed information on configuration in the configuration manual SCALANCE W-700 on the accompanying CD in the file:

PH_SCALANCE-W-700_76.pdf

Note

Make sure that you read the explanations and instructions in the README.txt file

2.2 Type designations

Abbreviations used

The information in the manuals for the SCALANCE W-700 product family often applies to more than one product variant. In such situations, the designations of the products are shortened to avoid having to list all the type designations. The following table shows how the abbreviations relate to the product variants.

Product group	The designation . . . stands for . . .	Product name
Ethernet client modules (IP30, cabinet installation)	W74x-1	W744-1 W746-1 W747-1
Ethernet client modules (IP65, installed outside a cabinet)	W74x-1PRO/RR	W744-1PRO W746-1PRO W747-1RR
All Ethernet client modules SCALANCE W	W74x	W744-1 W746-1 W747-1 W744-1PRO W746-1PRO W747-1RR
Access points (IP30, cabinet installation)	W784-1xx	W784-1 W784-1RR
Access points (IP65, installed outside a cabinet, extreme climatic requirements)	W786-xPRO/RR	W786-1PRO W786-2PRO W786-3PRO W786-2RR
Access points (IP65, installed outside a cabinet)	W788-xPRO/RR	W788-1PRO W788-2PRO W788-1RR W788-2RR
Access points with the "RR" range of functions	W78x-xRR	W784-1RR W786-2RR W788-1RR W788-2RR

Product group	The designation . . . stands for . . .	Product name
All SCALANCE W access points	W78x	W788-1PRO W788-2PRO W788-1RR W788-2RR W786-1PRO W786-2PRO W786-3PRO W786-2RR W784-1 W784-1RR
All SCALANCE W devices	W -700	W788-1PRO W788-2PRO W788-1RR W788-2RR W744-1PRO W746-1PRO W747-1RR W786-1PRO W786-2PRO W786-3PRO W786-2RR W784-1 W784-1RR W744-1 W746-1 W747-1

Description

3

3.1 Components of the product

The following parts belong to the consignment of the SCALANCE W788-xPRO/RR or W74x-1PRO/RR:

- SCALANCE W788-xPRO/RR or W74x-1PRO/RR
- 2 OMNI antennas ANT795-4MR
- 1 IE IP 67 hybrid plug-in connector
- 1 protective cap for the M12 socket
- 2 (or 4 with SCALANCE W788-2PRO or SCALANCE W788-2RR) sealing plugs for the R-SMA sockets
- 1 SIMATIC NET Industrial Wireless LAN CD

Please check that the consignment you have received is complete. If it is not complete, please contact your supplier or your local Siemens office.

3.2 LED displays

Information on the operating status and data transfer of the SCALANCE W-788-xPRO/RR or W74x-1PRO/RR

There are several LEDs on the front of the SCALANCE W788-xPRO/RR or W74x-1PRO/RR that provide information its operating status:

Note

If the LED for the WLAN interface is not green when the device starts up, although it is activated, the interface is not ready for operation (interface not initialized).

The main reason for this is usually that during commissioning of a SCALANCE W788-xPRO/RR or W74x-1PRO/RR products, a waiting time of up to 15 minutes can occur when the ambient temperature is below zero. The device is ready for operation at the specified ambient temperature as soon as the LED for the WLAN interface is lit green.

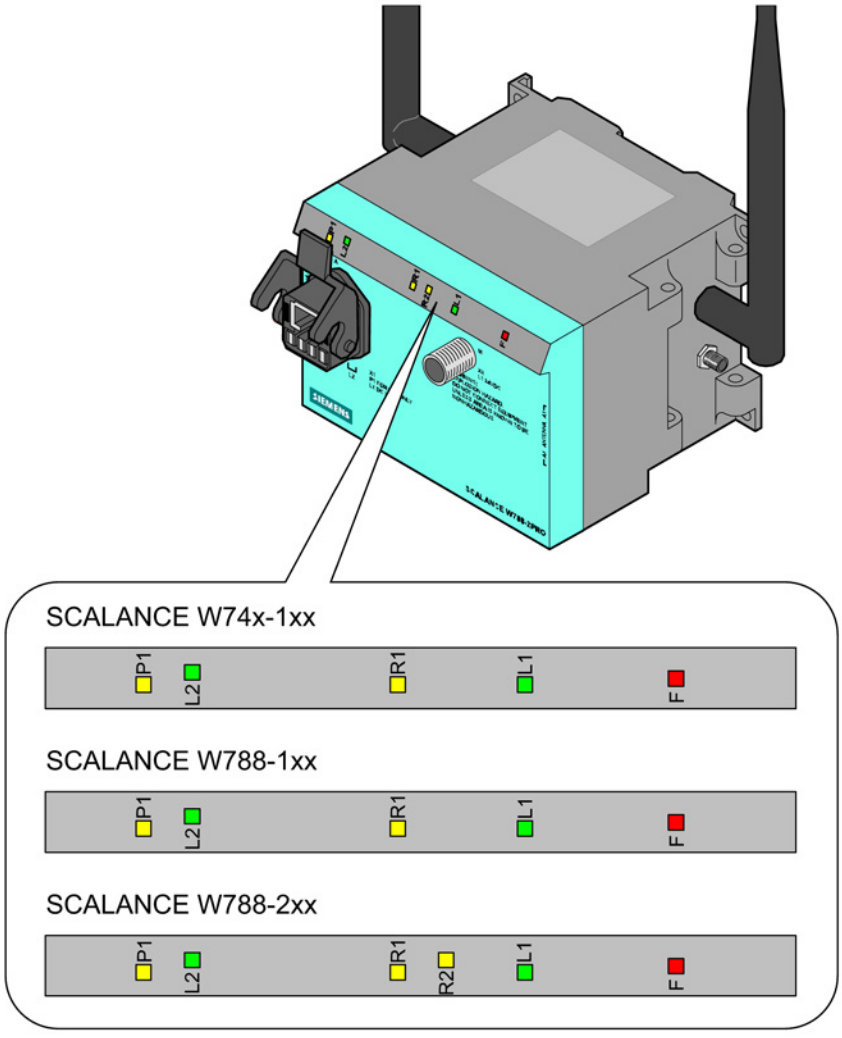


Figure 3-1 LEDs of the SCALANCE W788-xPRO/RR or W74x-1PRO/RR

LED	Color	Meaning
P1	Yellow	Data transfer over the Ethernet interface (traffic).
	Green	There is a connection over the Ethernet port. (Link)
	Flashing yellow	PRESET-PLUG detected.
	Yellow/green	PRESET function completed successfully.
	Flashing green	"Flashing" enabled over PST.
L2	Green	Power supply over the hybrid connector X1 (PoE or energy contacts).
R1	Yellow	Data transfer over the first WLAN interface.
	Green	*W788-xPRO/RR in access point mode:* The WLAN interface is initialized and ready for operation. *W788-xPRO/RR in client mode or W74x-1PRO/RR:* There is a connection over the first WLAN interface.
	Flashing green	*W788-xPRO/RR in access point mode:* The channels are being scanned. *W788-xPRO/RR in client mode or W74x-1PRO/RR:* The client is searching for a connection to an access point or ad hoc network.
	Green flashing quickly	*W788-xPRO/RR in access point mode:* With 802.11h, the channel is scanned for one minute for primary users before the channel can be used for data traffic. *W788-xPRO/RR in client mode or W74x-1PRO/RR:* The client waits for the adopt MAC address due to the setting <Auto find 'Adopt MAC'> and is connected to no access point.
	Green 3 x fast ,1 x long flashing	*W788-xPRO/RR in client mode or W74x-1PRO/RR:* The client waits for the adopt MAC address due to the setting <Auto find 'Adopt MAC'> and is connected to an access point.
	Flashing yellow	PRESET-PLUG detected.
	Yellow/green	PRESET function completed successfully.

LED	Color	Meaning
R2	Yellow	*W788-xPRO/RR in access point mode:* Data transfer over the second WLAN port. *W788-xPRO/RR in client mode or W74x-1PRO/RR:* The LED is always off because the 2nd interface is not available in client mode.
	Green	*W788-xPRO/RR in access point mode:* The WLAN interface is initialized and ready for operation. *W788-xPRO/RR in client mode or W74x-1PRO/RR:* The LED is always off because the 2nd interface is not available in client mode.
	Flashing green	*W788-xPRO/RR in access point mode:* The channels are being scanned. *W788-xPRO/RR in client mode or W74x-1PRO/RR:* The LED is always off because the 2nd interface is not available in client mode.
	Green flashing quickly	*W788-xPRO/RR in access point mode:* With 802.11h, the channel is scanned for one minute for primary users before the channel can be used for data traffic. *W788-xPRO/RR in client mode or W74x-1PRO/RR:* The LED is always off because the 2nd interface is not available in client mode.
	Flashing yellow	PRESET-PLUG detected.
	Yellow/green	PRESET function completed successfully.
L1	Green	Power supply over the M12 connector (X2).
F	Red	An error has occurred during operation of the SCALANCE W788-xPRO/RR or W74x-1PRO/RR.
	Flashing red, R1 or R2 flashing green at the same time	A primary user was found on all enabled channels.

Note

Primary user (radar) on all enabled channels

If the device detects a primary user on all enabled channels (for example radio waves of a radar station), the LEDs **F** and **R1** flash. No data traffic is then possible for the next 30 minutes. After this time, the device runs the scan again and checks whether a primary user still exists. If no primary user is detected, data traffic is possible again.

The wait time of 30 minutes is necessary due to legal requirements and cannot be shortened even by resetting the device.

3.3 Reset button

Functions of the reset button

The reset button is on the rear of the device below the sealing screw directly beside the C-PLUG and has several functions:

- Restart of the device

  To restart the device, press the Reset button.

- Loading new firmware

  If the normal procedure with the Load & Save menu of Web Based Management does not work, the reset button can be used to load new firmware. This situation can occur if there was a power outage during the normal firmware update.

- Restoring the default parameters (factory defaults)
- Adopting the configuration data from the PRESET PLUG.

Mounting

4

4.1 Notes on operating the device in a hazardous area

⚠ WARNING

EXPLOSION HAZARD

When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

⚠ WARNING

Requirements for the cabinet/enclosure

To comply with EU Directive 94/9 (ATEX95), this enclosure must meet the requirements of at least IP54 in compliance with EN 60529.

4.2 Securing the housing

Grounding terminal

⚠ WARNING

To operate the SCALANCE W788 safely, the housing must make contact with a chassis ground cable. Do not use the SCALANCE W788 without a ground cable connected.

The ground cable can be connected to one of the securing screws. To allow this, several of the screw contact surfaces in the housing do not have a powder coating. You will find these contact surfaces on the right-hand side of the housing (when looking at the front of the housing).

Wall mounting or standard rail

Note

Installation location

There are no restrictions regarding the installation location for the device.

Antennas, in particular directional antennas, must be mounted in keeping with their characteristics (refer to the technical specifications of the antenna --> Radiation pattern diagrams).

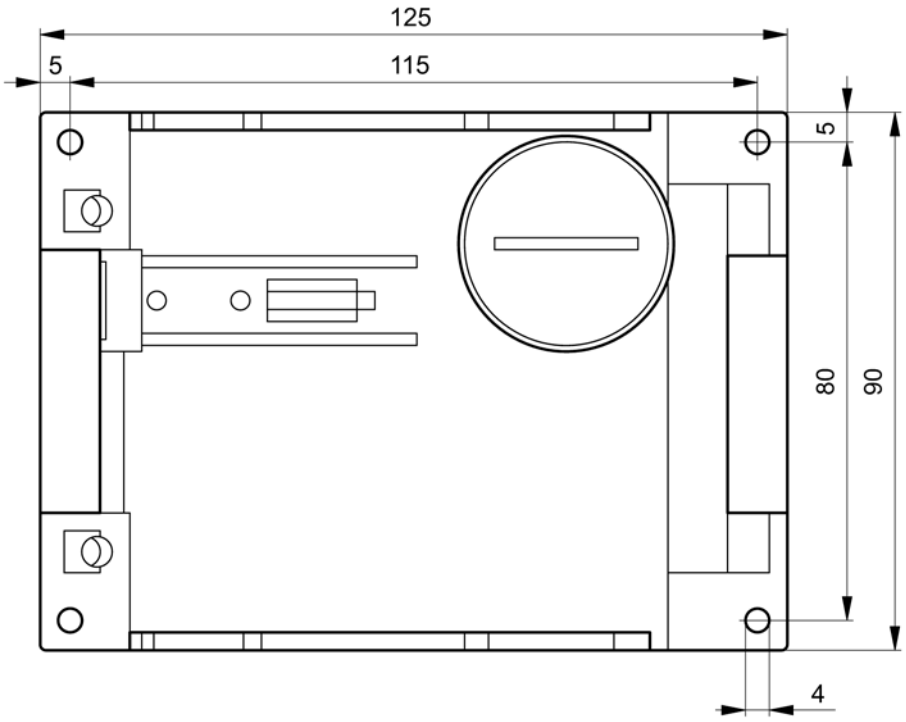
There are two ways of securing the housing:

- Wall mounting
  Use the holes in the housing to screw the device to the wall or on a horizontal surface.
- Standard rail mounting
  Mount the SCALANCE W788-xPRO/RR or W74x-1PRO/RR on a 90 mm long, vertically mounted section of standard rail (S7-300). In this case, the standard rail serves as an adapter between the wall and SCALANCE W788-xPRO/RR or W74x-1PRO/RR. If you want to mount the SCALANCE W788-xPRO/RR or W74x-1PRO/RR along with a PS791-1PRO, you will require a 150 mm long standard rail.

Make sure that there is suitable strain relief for the connecting cable.

Drilling template

The location of the holes for wall mounting of the SCALANCE W788-xPRO/RR / W74x-1PRO/RR is shown in the following diagram:



NOTICE
Premature aging of the device and cables due to UV radiation For applications outdoors, the use of the hardware SCALANCE W786 is advisable due to its greater suitability. Protect the SCALANCE W788-xPRO/RR or W74x-1PRO/RR from direct sunlight by providing suitable shade. This avoids unwanted heating of the device and prevents premature aging of the device and cabling. When operating the SCALANCE W outdoors, it must be mounted so that it is protected from UV. UV radiation can discolor the front panel of the SCALANCE W788-xPRO/RR or W74x-1PRO/RR. Discoloring of the front panel does not impair the mechanical stability of the device. The device must also not be subjected to long periods of rain (provide cover to protect from rain). The cover should be made of a synthetic material since metal impairs the radiation of radio waves.

Note

The minimum distance to fluorescent lamps should be 0.5 m. When installed in a cabinet, we recommend that you do not install relays on the same or on directly neighboring mounting rails.

Connecting up

5

5.1 Connectors for external antennas and power supply

Hybrid female connector and M12 male connector

The SCALANCE W788-xPRO / W788-xRR / W74x-1xx is attached to Ethernet via a hybrid socket on the front of the housing (position **A** in the figure). This port also has contacts for the operating voltage.

NOTICE
PoE with power source equipment Note the following if you use PoE with a PSE (Power Source Equipment): The chassis of an additional 24 V power supply must not be grounded!

NOTICE
Strain relief for the hybrid cable Make sure that there is strain relief for the hybrid cable socket in both directions (along the cable axis and transverse). Forces can be exerted on the socket simply from the weight of the hybrid cable, for example when the SCALANCE W is installed high up.

Note

Protective cap for the hybrid socket

If you do not use the hybrid socket, this must be covered with a protective cap, otherwise IP 65 protection is lost. A suitable protective cap is available as an accessory (order no. 6ES7194-1JB10-0XA0). If you do not use the M12 connector, the supplied protective cap must also be fitted to retain the IP65 degree of protection.

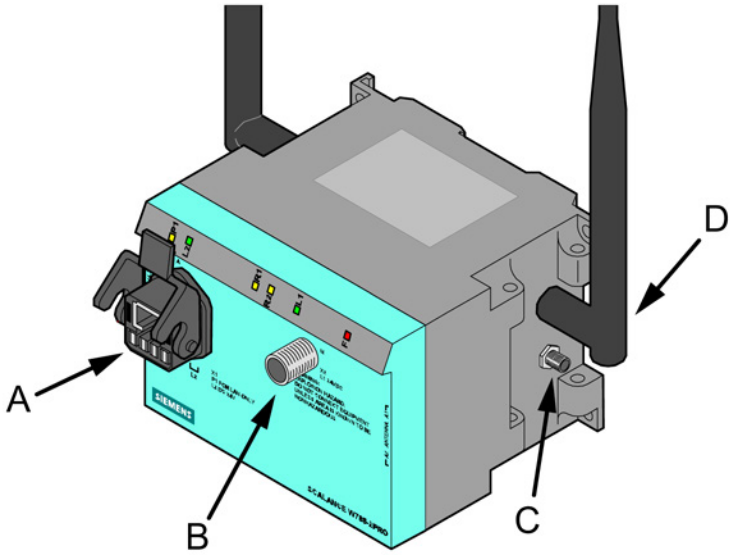


Figure 5-1 Connectors of the SCALANCE W788-xPRO/RR or W74x-1PRO/RR. The additional antenna connectors (position C) only exist for the types W788-2PRO and W788-2RR.

As an alternative or in addition to this, you can also use the M12 plug for the power supply (position **B** in the previous figure).

You can fit additional antennas to the sides of the SCALANCE W788-2PRO and SCALANCE W788-2RR with an antenna cable (position **C** in the previous figure). If you install the SCALANCE W788-xPRO/RR or W74x-1PRO/RR in a cabinet, you will need to unscrew the antennas due to the restricted communication (position **D** in the figure). In this case, the connection is over detached antennas installed outside the cabinet. On the front panel, there is also an identifier for the antenna connectors. The A connectors are on the right-hand side and B connectors B on the left-hand side.

Suitable connecting cable for a connection between SCALANCE W788-xPRO/RR or W74x-1PRO/RR and a detached antenna are available from SIMATIC NET. You will find detailed information in the section "Suitable antenna cables and antennas for the SCALANCE W-700".

Arrangement of interfaces and connectors

Note

The distance between the antennas of the various WLAN interfaces must be at least 1 m.

Note

Terminating resistor

Each WLAN interface has two antenna connectors. If you use only one connector, make sure that you connect a terminating resistor to the second connector to ensure trouble-free operation of the SCALANCE W788-xPRO/RR or W74x-1PRO/RR.

The following figure shows the location of the sockets for the individual interfaces:

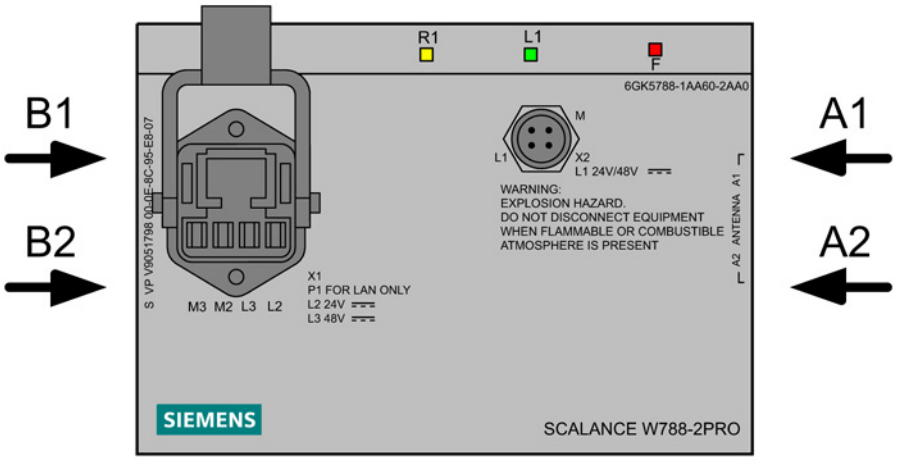


Figure 5-2 Antenna connectors of the SCALANCE W788-xPRO/RR or W74x-1PRO/RR. The antenna connectors **A2** and **B2** only exist for the types W788-2PRO and W788-2RR.

5.2 Replacing the C-PLUG

Procedure

Follow the steps below to replace the C-PLUG of a SCALANCE W788-xPRO/RR or W74x-1PRO/RR:

Note

In terms of the C-PLUG, the WLAN devices work in two modes:

- Without C-PLUG
  The device stores the configuration in internal memory. This mode is active when no C-PLUG is inserted.
- With C-PLUG
  The configuration stored on the C-PLUG is displayed over the user interfaces. In this mode, the internal memory is neither read nor written. If changes are made to the configuration, the device stores the configuration directly on the C-PLUG. This mode is active when a C-PLUG is inserted. As soon as the device is started with a C-PLUG inserted, the WLAN device starts up with the configuration data on the C-PLUG.

1. Turn off the power to the device.
2. Remove the old SCALANCE W788-xPRO/RR or W74x-1PRO/RR from its mounting and open the sealing screw on the rear with a coin or broad screwdriver.
3. Remove the C-PLUG.
4. Open the sealing screw of the new device in the same way and insert the C-PLUG of the old device.
5. Replace the sealing screws of both devices.

If a new C-PLUG is inserted in a SCALANCE W788-xPRO/RR or W74x-1PRO/RR, the configuration stored locally on the device is saved to the C-PLUG. If an incorrect C-PLUG (for example from another device or a damaged plug) is inserted, the device signals an error with the red LED. The user then has the choice of either removing the C-PLUG again or selecting the option to reformat the C-PLUG and use it.

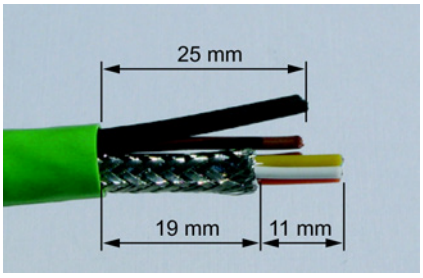
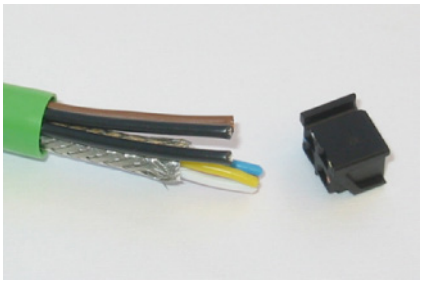
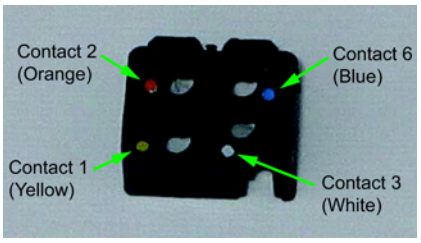
Note

It is essential that the configuration on the C-PLUG was generated with a firmware version ≤ the firmware version on the destination device.

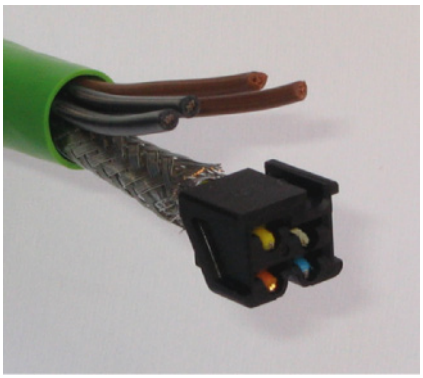
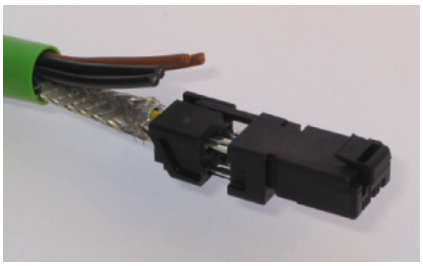
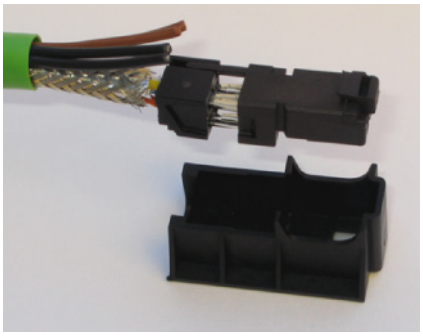
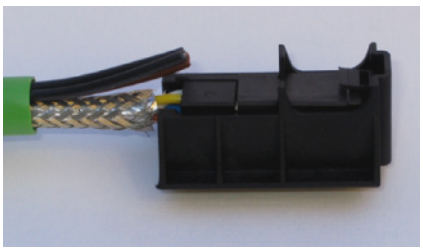
Example: A C-PLUG with version V3.0 cannot be used for a SCALANCE W78x with firmware version V2.4.

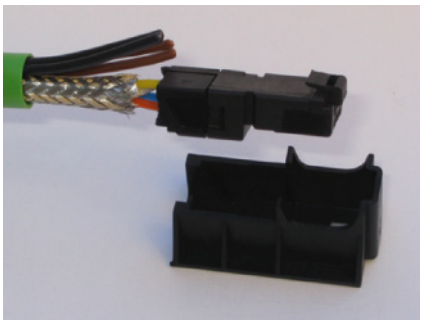
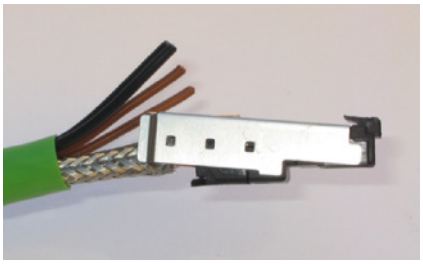
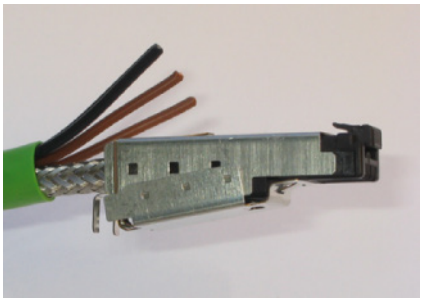
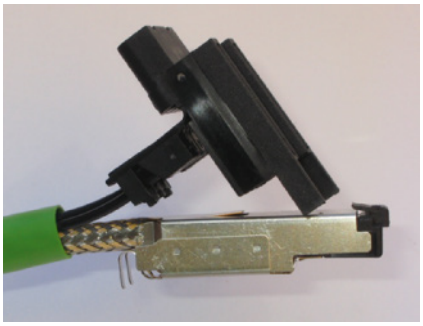
5.3 Assembling an IE hybrid cable 2 x 2 + 4 x 0.34 with an IE IP 67 hybrid connector

Procedure

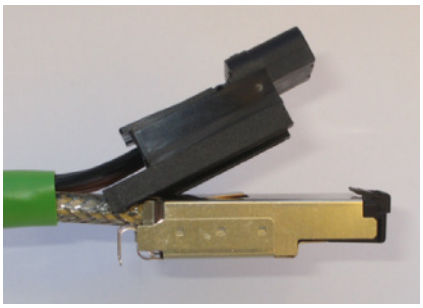
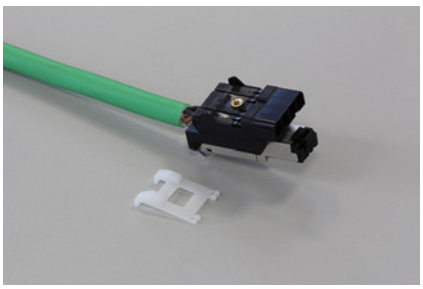
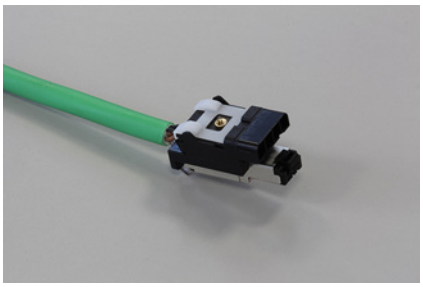
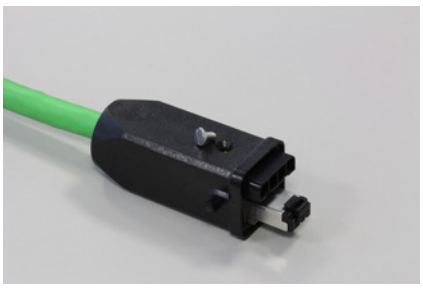
	Push the hexagonal nut, the sealing sleeve and the housing over the cable jacket in the order shown.
	Remove the following lengths of cable jacket and shield braid: • 25 mm for the power leads. • 30 mm jacket for the data leads (shorten the braid by 11 mm). Cut off the filler at the height of the cable jacket.
	Arrange the data leads according to the color codes on the splice element. The following table shows the assignment of the data leads.
	Contact and color assignment of the splice element.

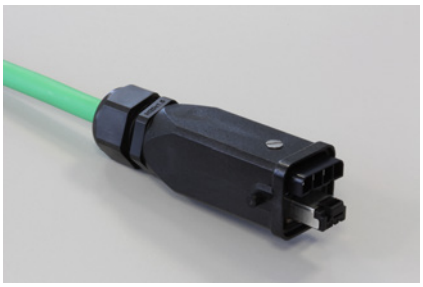
Wire color code (standard)	White	Blue	Yellow	Orange
Connector color code (Siemens IE)	White	Blue	Yellow	Orange
Siemens IE FC RJ-45 socket (reference)	3	6	1	2

	Insert the all the data leads at the same time into the splice element is far as they will go.
	Close the splice element and RJ-45 data module until they lock together.
	Insert the data module and the splice element into the supplied IDC assembly tool.
	Press the data module and the IDC assembly tool together to establish the installation piercing connection.

	Remove the assembled data module from the IDC assembly tool.
	Position the top shield plate and press it over the cable shield.
	Position the lower shield plate and press it and the upper shield plate together until they lock together with an audible "click".
	Arrange the power leads and insert them as far as they will go into the hinge elements of the isolation body. The following table shows the assignment of the power leads.

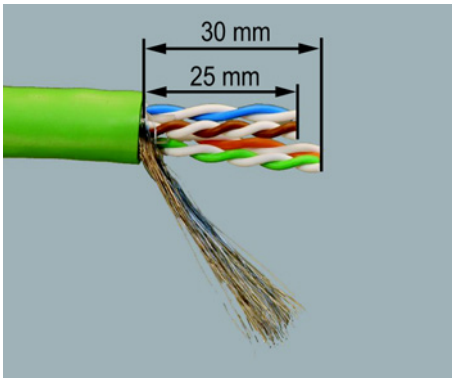
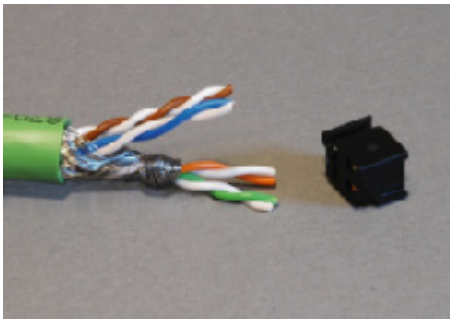
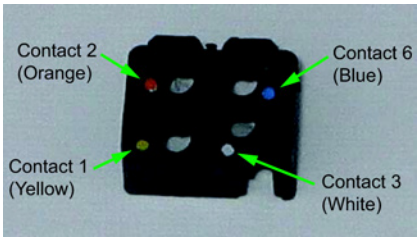
Wire color code (standard)	**Brown**	**Brown**	**Black**	**Black**
Function	24 V	48 V PoE	Ground	Chassis PoE
Power supply insert module	1	2	3	4

	Press each individual hinge element together with the integrated IDC contact.
	
	Position the locking element on the insulator body.
	Push the housing over the assembled data module and the insulator body until they lock together (there should be an audible click).
	Secure the housing with the sealing screw

	Screw the sealing sleeve to the housing. Use an open key with a size of 24 mm. The required tightening torque is 4.5 Nm.
	Screw the hexagonal nut and sealing sleeve together. Once again the required torque is 4.5 Nm.

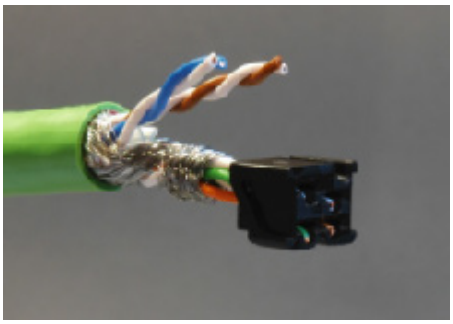
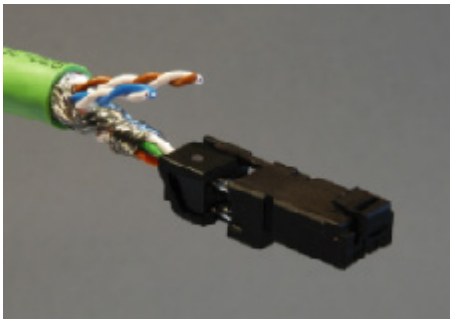
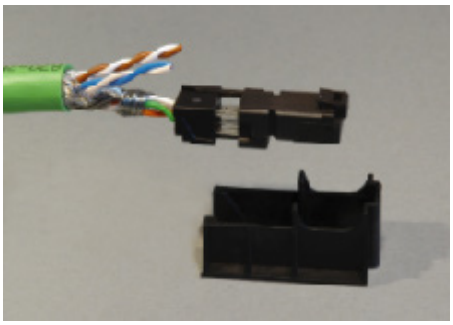
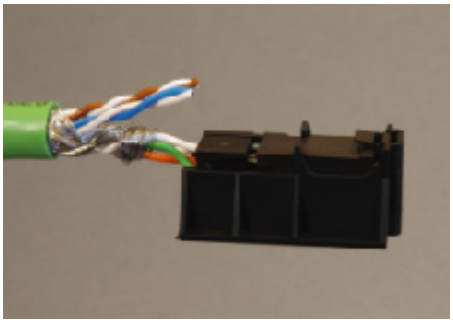
5.4 Fitting the IE FC TP standard cable 4 x 2 GP to an IE IP 67 hybrid connector

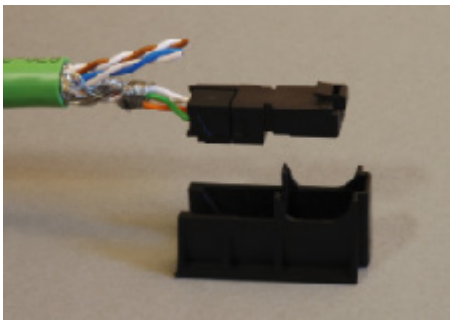
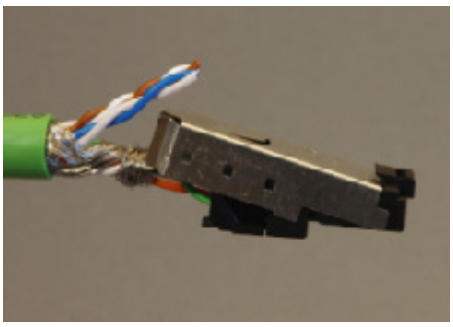
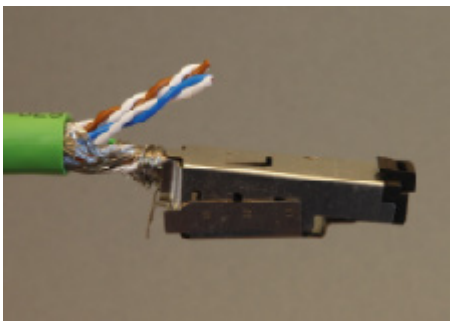
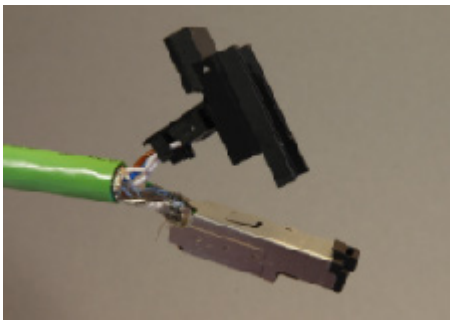
Procedure

	Push the hexagonal nut, the sealing sleeve and the housing over the cable jacket in the order shown.
	Remove the following lengths of cable jacket and shield braid: • 25 mm for the power leads • 30 mm for the data leads To achieve good shielding, the shield braid must be alt least 30 mm long.
	Arrange the data leads according to the color codes on the splice element. The following table shows the assignment of the data leads. Wind the shield braid around the data leads. As a result, the shielding of the cable has contact to the shield plate of the splice element that will be fitted later.
	Contact and color assignment of the splice element.

Color coding of the standard cable	**White / orange ***	**Orange**	**White / green ***	**Green**
Connector color code (Siemens IE)	White	Blue	Yellow	Orange
Siemens IE FC RJ-45 socket (reference)	3	6	1	2

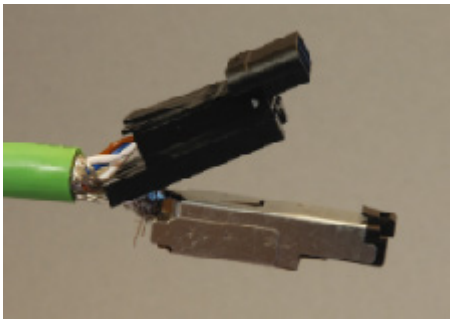
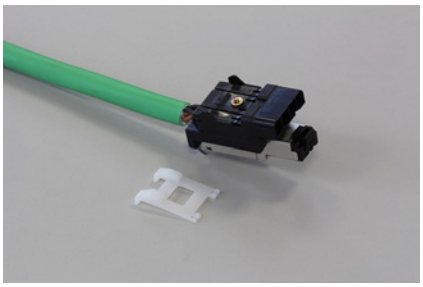
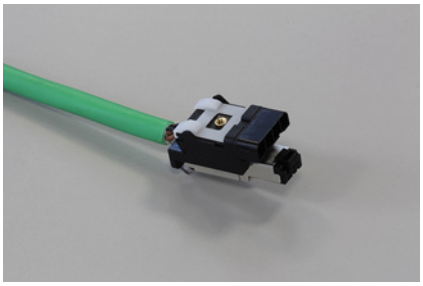
* White wire of the pair.

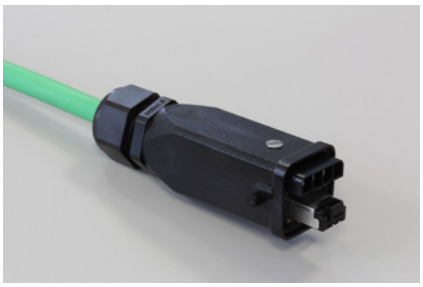
	Insert the all the data leads at the same time into the splice element is far as they will go.
	Close the splice element and RJ-45 data module until they lock together.
	Insert the data module and the splice element into the supplied IDC assembly tool.
	Press the data module and the IDC assembly tool together to establish the installation piercing connection.

	Remove the assembled data module from the IDC assembly tool.
	Position the top shield plate and press it over the cable shield.
	Position the lower shield plate and press it and the upper shield plate together until they lock together with an audible "click".
	Arrange the power leads and insert them as far as they will go into the hinge elements of the isolation body. The following table shows the assignment of the power leads.

Wire color code (standard)	**White / blue ***	**Blue**	**White / brown ***	**Brown**
Function	24 V	48 V PoE	Ground	Chassis PoE
Power supply insert module	1	2	3	4

* White wire of the pair.

	Press each individual hinge element together with the integrated IDC contact. Recommendation: Use a small slotted screwdriver (max. 3.5 mm) as a lever.
	
	Position the locking element on the insulator body.
	Push the housing over the assembled data module and the insulator body until they lock together (there should be an audible click).
	Secure the housing with the sealing screw

	Screw the sealing sleeve to the housing. Use an open key with a size of 24 mm. The required tightening torque is 4.5 Nm.
	Screw the hexagonal nut and sealing sleeve together. Once again the required torque is 4.5 Nm.

5.5 Pinning of the M12 male connector

Power supply over the M12 connector

The M12 male connector on the front of the SCALANCE W7xx has the following pinning:

Pin	Function
Pin 1	24 V DC, 48 V DC
Pin 2	--
Pin 3	Ground
Pin 4	--

5.6 Lightning protection, power supply, and grounding

Notes on lightning protection

⚠ WARNING

Danger due to lightning strikes

Antennas installed outdoors must be within the area covered by a lightning protection system. Make sure that all conducting systems entering from outdoors can be protected by a lightning protection potential equalization system.

When implementing your lightning protection concept, make sure you adhere to the VDE 0182 or IEC 62305 standard.

Suitable lightning conductors are available in the range of accessories of SIMATIC NET Industrial WLAN:

Lightning protector LP798-2N (order no. 6GK5798-2LP10-2AA6 is the most suitable version)

Lightning protector LP798-1N (order no. 6GK5798-2LP00-2AA6)

⚠ WARNING

Danger due to lightning strikes

Installing one of these lightning protectors between an antenna and a SCALANCE W-700 is not adequate protection against a lightning strike. The LP798-2N and LP798-1N lightening protectors only work within the framework of a comprehensive lightning protection concept. If you have questions, ask a qualified specialist company.

Note

The requirements of EN61000-4-5, surge immunity tests on power supply lines, are met only when a Blitzductor is used with 12 - 24 V DC and 48 V DC:

12 - 24 V DC: BVT AVD 24 type no. 918 422

48 VDC:
BXT ML2 BD S48, Part no. 920245
BXT BAS, Part no. 920300 (base)

Manufacturer: DEHN+SÖHNE GmbH+Co.KG, Hans Dehn Str. 1, Postfach 1640, D - 92306 Neumarkt, Germany

Note

48 V lightning protector

When using the 48 V DC lightning protector, the power supply must be fused with 1 A.

Safety extra low voltage

⚠ WARNING

Danger to life from overvoltage, fire hazard

The equipment is designed for operation with Safety Extra Low Voltage, SELV by a Limited Power Source, LPS. (This does not apply to 100 V ... 240 V devices.)

This means that only Safety Extra Low Voltage (SELV) with Limited Power Source, LPS complying with EN60950 / EN 60950-1 / VDE0805 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

Exception:

Power supply with PELV (according to VDE 0100-410 or IEC 60364-4-41) is also possible if the generated rated voltage does not exceed the voltage limits 25 V AC or 60 V DC.

⚠ WARNING

Take measures to prevent transient voltage surges of more than 40% of the rated voltage. This is the case if you only operate devices with SELV (safety extra-low voltage).

Redundant power supply

NOTICE

Setup with redundant power supply (Power over Ethernet + 24 V DC or 48 V DC)

To use a redundant 24 V power supply (or 48 V with SCALANCE W786) and Power over Ethernet (PoE), a separate floating 24 V source (or 48 V source for W786) must be available for each SCALANCE W-700. Otherwise there is no longer isolation of the input voltages of different devices required for the PoE function and functionality may be disturbed.

Power supply without power grid

To operate the device without a connection to the power grid, you can use a solar panel. The company Solis Energy (www.solisenergy.com) offers suitable solutions. The size of the panel required depends on the daily hours of sunlight. The manufacturer provides assistance in selecting the panel. The solar solution must be designed for 15 watts.

Grounding

NOTICE
Damage to the device due to potential differences To fully eliminate the influence of electromagnetic interference, the device must be grounded. There must be no potential difference between the following parts, otherwise the device or other connected device could be severely damaged: • Housing of the SCALANCE W-700 and the ground potential of the antenna. • Housing of the SCALANCE W-700 and the ground potential of a device connected over Ethernet. • Housing of the SCALANCE W-700 and the shield contact of the connected Ethernet cable. Connect both grounds to the same foundation earth or use an equipotential bonding cable.

Interruption of the power supply

NOTICE
Damage to the Ethernet interface Repeated fast removal and insertion of the Ethernet cable when using Power-over-Ethernet and when there is a redundant power supply can cause damage to the Ethernet interface. Avoid repeatedly removing and inserting the Ethernet cable when using Power-over-Ethernet and a redundant power supply.

Notes on operating the device in a hazardous area

⚠ WARNING
EXPLOSION HAZARD DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

⚠ WARNING
EXPLOSION HAZARD
SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.

⚠ WARNING
EXPLOSION HAZARD
DO NOT OPEN WHEN ENERGIZED.

Special notes for the SCALANCE W786-xPRO/RR

Warning Notices cULus haz.loc.

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D; Class I, Zone 2, Group IIC or non-hazardous locations.

WARNING - Cat. Nos. EAP-Wx-yy-zx (US installation only):

- PLTC cable type and manufacturer shall be specified: Listed (QPTZ), Type 5240U1 (Waterdog PLTC-ER) manufactured by Belden.

- The PLTC cable for the power supply must be installed in a manner to avoid tensile stress at the termination fittings in accordance with Article 501.10 (B)(1)(4) of the NEC.

- The PLTC cable for the power supply must be installed in accordance with Article 725.154 (D)(1) through (D)(4) of the NEC.

WARNING -Cat. Nos. EAP-Wx-yy-zx (Canadian installation only):

- TC cable type and manufacturer shall be specified: Listed (QPOR), Type JZ-604 TC manufactured by Helukabel GmbH.

- The TC cable for the power supply must be installed in areas of industrial establishments that are inaccessible to the public and in a manner that meets the requirements in Rule 12-2202(2) of the CEC:
Installed in conduit, other suitable raceway, or direct buried, when not in cable tray. Provided with mechanical protection where subject to damage either during or after installation.
Installed only where qualified persons service the installation.

When operated in potential hazardous areas:

WARNING - Explosion Hazard – Do not disconnect while circuit is live unless area is known to be non-hazardous

5.7 Suitable antenna cables and antennas for SCALANCE W-700

Antenna connector: N-Connect/R-SMA connecting cable

The N-Connect/R-SMA male/male flexible connecting cable is available as an accessory for direct connection of an antenna to a SCALANCE W-700.

Length in m	Order number
1	6XV1875-5CH10
2	6XV1875-5CH20
5	6XV1875-5CH50
10	6XV1875-5CN10

Antenna connector: N-Connect/ N-Connect connecting cable

The N-Connect/N-Connect male/male flexible connecting cable is available as an accessory for connecting an antenna to the lightning protector LP798-1N.

Length in m	Order number
1	6XV1875-5AH10
2	6XV1875-5AH20
5	6XV1875-5AH50
10	6XV1875-5AN10

There is a control cabinet feedthrough available for IWLAN devices located in a control cabinet. You will find detailed information in the catalog IK PI.

Antennas

The following antennas have been approved for use with a SCALANCE W-700:

Type	Properties	Order no.
ANT795-6MN	Omni antenna 2.4 / 5 GHz, ceiling mounted	6GK5795-6MN00-0AA6
ANT792-6MN	Omni antenna 2.4 GHz, wall mounted	6GK5792-6MN00-0AA6
ANT793-6MN	Omni antenna 5 GHz, wall mounted	6GK5793-6MN00-0AA6
ANT792-8DN	Directional antenna 2.4 GHz, wall mounted	6GK5792-8DN00-0AA6
ANT793-8DN	Directional antenna 5 GHz, wall mounted	6GK5793-8DN00-0AA6
ANT795-6DN	Directional antenna 2.4 / 5 GHz, wall mounted	6GK5795-6DN00-0AA6

Type	Properties	Order no.
ANT795-4MR	Omni antenna 2.4 / 5 GHz, mounted directly on a SCALANCE W788-xPRO/RR or W74x-1PRO/RR	6GK5795-4MR00-0AA6
ANT795-4MS	Omni antenna 2.4 / 5 GHz, mounted directly on a SCALANCE W788-xPRO/RR or W784-1xx or W74x-1PRO/RR or W74x-1	6GK5795-4MS00-0AA6
ANT792-4DN	RCoax antenna 2.4 GHz	6GK5792-4DN00-0AA6
ANT793-4MN	RCoax antenna 5 GHz	6GK5793-4MN00-0AA6

NOTICE

ANT795-4MS

The ANT795-4MS antenna has degree of protection IP30 and is therefore suitable for a dry environment.

5.8 Cabling for power supply and Ethernet

Suitable cables

The following cables are available for connecting a SCALANCE W788-xPRO/RR or SCALANCE W74x-1PRO/RR to the power supply and Ethernet:

- IE hybrid cable 2 x 2 + 4 x 0.34 (order no. 6XV1870-2J)

  The two data wire pairs are separately shielded. This cable is particularly suitable for assembly with the IE IP 67 hybrid connector.

- IE FC TP standard cable 4 x 2 GP (order no. 6XV1870-2E)

  In these cable types, two wires are twisted. All four pairs of wires are inside a common shield.

- 2 x 2 IE cable, the optional power supply (18 - 48 V DC) is over M12 connectors.

Cable selection and interference exposure

A decisive factor in the selection of a cable type is the electromagnetic interference to which the current lines between the power supply and the FC RJ-45 modular outlet are subjected. Due to the separate shielding of the data wires, such interference has less effect on the data transmission on a hybrid cable than on TP standard cable or TP flexible cable.

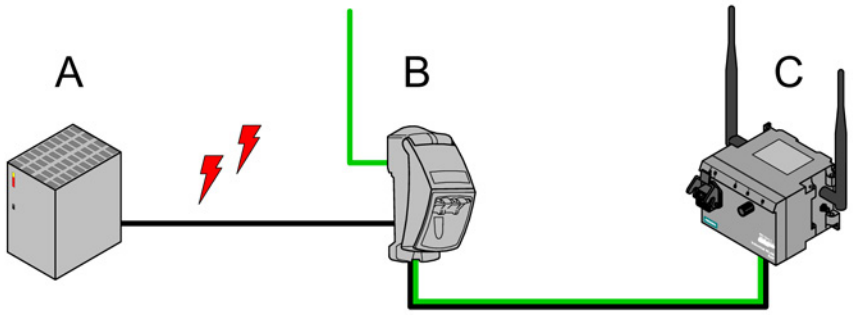


Figure 5-3 Wiring a SCALANCE W788-xPRO/RR with electromagnetic interference between the power supply and modular outlet
A power supply
B FC RJ-45 modular outlet with power insert
C SCALANCE W788-xPRO/RR

Technical specifications 6

6.1 Technical specifications for the SCALANCE W788-xPRO/RR and W74x-1PRO/RR

Device variants

The technical specifications of the

- SIMATIC NET SCALANCE W744-1PRO
- SIMATIC NET SCALANCE W746-1PRO
- SIMATIC NET SCALANCE W747-1RR
- SIMATIC NET SCALANCE W788-1PRO
- SIMATIC NET SCALANCE W788-2PRO
- SIMATIC NET SCALANCE W788-1RR
- SIMATIC NET SCALANCE W788-2RR

are largely identical. Unless indicated otherwise in the table, the following tables apply to all the devices listed above:

Data transfer

Ethernet transfer rate	10/100 Mbps
Wireless transmission rate	1 ... 54 Mbps (108 Mbps)
Wireless standards supported	802.11a 802.11b 802.11g 802.11h
Power supply standards supported	802.3af (Power over Ethernet)

Interfaces

Note

Bridging a power outage is possible only with an input voltage of 24 VDC (-15% . . . +20%).

Power	• M12 connector 24 VDC, 48 VDC (minimum permitted voltage 18 VDC, maximum permitted voltage 57 VDC) • Power contacts in hybrid connector 24 VDC, 48 VDC (minimum permitted voltage 18 VDC, maximum permitted voltage 57 VDC) • RJ-45 jack Power over Ethernet (48 VDC) The following applies to all named power contacts: Power supply cables isolated according to IEEE 802.3af, isolation resistance > 2 Mohms.
Data	IE IP67 hybrid connector R-SMA antenna sockets (2 x or 4 x with the 788-2PRO)

Electrical data

Maximum power consumption	< 9 W
Typical power consumption (a wireless card)	6 W
Typical power consumption (two wireless cards)	7 W

Construction

Dimensions without antennas (W x H x L)	125 mm x 88 mm x 108 mm
Weight	approx. 1050 g

Permitted ambient conditions

Operating temperature	-20°C to 60°C
Transportation/storage temperature	-40°C to 70°C
Degree of protection	Tested to IP65

MTBF information (mean time between failure)

MTBF	67 years

Transmit power

Table 6- 1 Transmit power in IEEE 802.11b mode (2.4 GHz)

Data rate [Mbps]	P_0 [dBm]
1	20
2	20
5.5	20
11	20

Table 6- 2 Transmit power in IEEE 802.11g mode (2.4 GHz)

Data rate [Mbps]	P_0 [dBm]
6	17
9	17
12	17
18	17
24	17
36	17
48	17
54	16

Table 6- 3 Transmit power in IEEE 802.11a/h mode (5 GHz)

Data rate [Mbps]	P_0 [dBm]
6	17
9	17
12	17
18	17
24	17
36	16
48	15
54	13.5

Receiver sensitivity

Table 6- 4 Receiver sensitivity in IEEE 802.11b mode (2.4 GHz)

Data rate [Mbps]	P_e [dBm]
1	-98
2	-94
5.5	-92
11	-90

Table 6- 5 Receiver sensitivity in IEEE 802.11g mode (2.4 GHz)

Data rate [Mbps]	P_e [dBm]
6	-93
9	-92
12	-91
18	-88
24	-85
36	-82
48	-77
54	-76

Table 6- 6 Receiver sensitivity in IEEE 802.11a/h mode (5 GHz)

Data rate [Mbps]	P_e [dBm]
6	-90
9	-89
12	-88
18	-86
24	-83
36	-80
48	-75
54	-74

PNIO - performance data

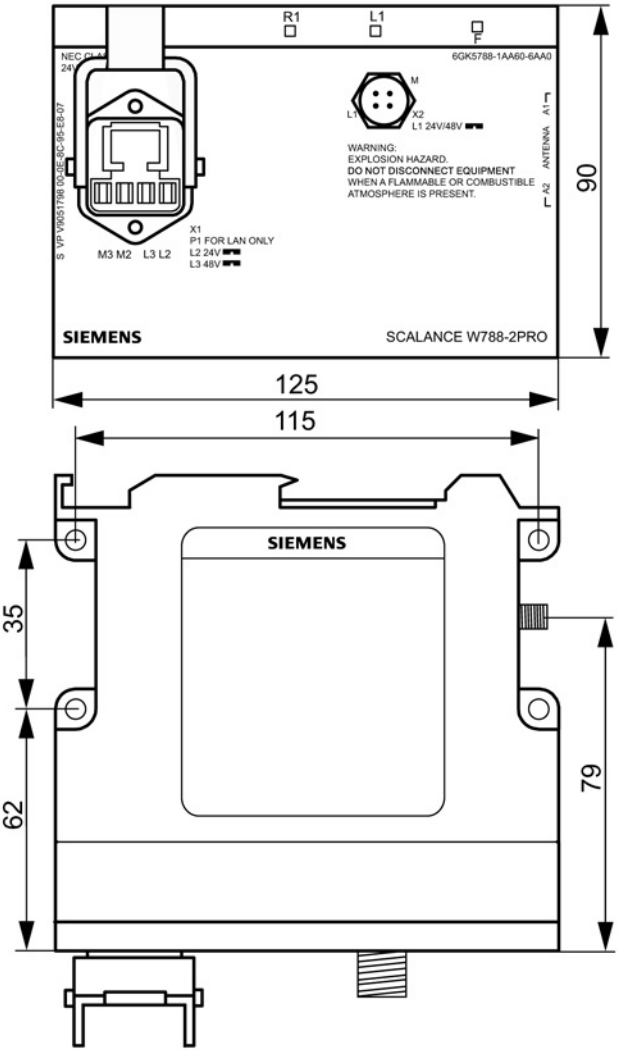
Even in the planning phase of a plant, it is important to know the reaction time of IO communication and the delay time for data communication in a PROFIBUS, PROFINET IO or Industrial Ethernet network. To provide you with reliable information on typical plants with different topologies, a large number of different configurations have been set up and measured. Based on these measured values, you can do the following:

- Design plants ideally in terms of their communication response and
- Compare different plant configurations with each other

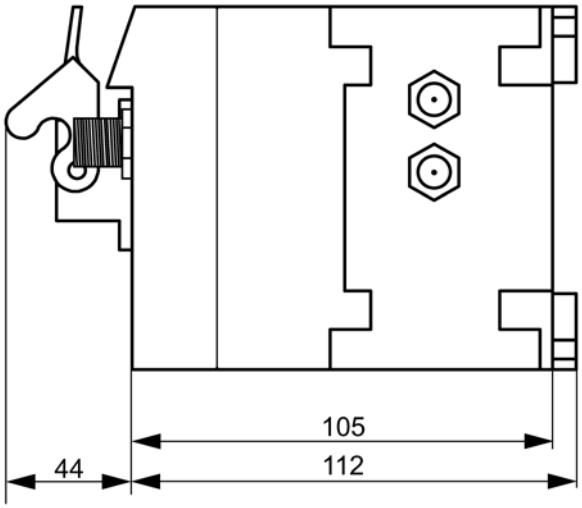
You will find the measured values with the following link:
http://www.siemens.de/automation/pd

6.2 Dimension drawing SCALANCE W788

Front view and view from above of the SCALANCE W788



Side view of the SCALANCE W788



6.3 Technical specifications ANT795-4MR

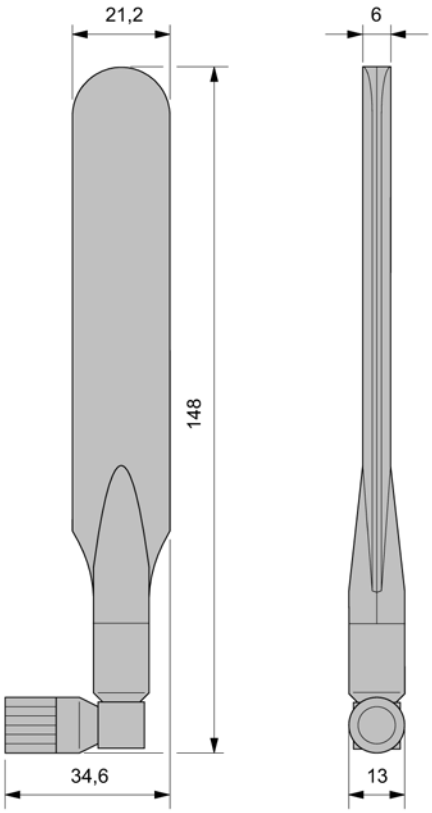
Mechanical characteristics

Connector	R-SMA male for connection to SCALANCE W78x or SCALANCE W74x
External material	Polycarbonate
Silicone-free	

Electrical characteristics

Frequency range	2.4 ~ 2.4835 GHz 5.15 ~ 5.35 GHz 5.725 ~ 5.85 GHz
Impedance	50 ohms
Voltage standing wave ratio	≤ 2.0
Return loss	≤ -10 dB
Gain at 2.45 GHz	3 dBi
Gain at 5.25 GHz	5 dBi
Polarization	Linear and vertical
Ambient temperature	- 20 °C to + 60 °C

6.4 Dimension drawing ANT795-4MR



6.5 Permitted antennas

Accessories for SCALANCE W-700

Note

When you select an antenna, keep in mind the national approvals for your SCALANCE W7xx.

Characteristics	Type	Frequency / GHz	Antenna gain / dBi	Impedance / Ω	Order No.
Omni	ANT795-6MN	2.4	6	50	6GK5795-6MN00-0AA6
		5	8		
Omni	ANT792-6MN	2.4	6	50	6GK5792-6MN00-0AA6
Omni	ANT793-6MN	5	5	50	6GK5793-6MN00-0AA6
Patch	ANT795-6DN	2.4	9	50	6GK5795-6DN00-0AA6
		5	9		
Directional antenna	ANT792-8DN	2.4	14	50	6GK5792-8DN00-0AA6
Directional antenna	ANT793-8DN	5	18	50	6GK5793-8DN00-0AA6
Helix (for RCoax)	ANT792-4DN	2.4	4	50	6GK5792-4DN00-0AA6
λ5/8 (for RCoax)	ANT793-4MN	5	6		6GK5793-4MN00-0AA6
RCoax	IWLAN RCoax PE 1/2" 2.4 GHz	2.4	0	50	6XV1875-2A
RCoax	IWLAN RCoax PE 1/2" 5 GHz	5	0	50	6XV1875-2D

Certification 7

7.1 Approvals for the SCALANCE W788-xPRO/RR and 74x-1PRO/RR

CE conformity

The products

SIMATIC NET SCALANCE W788-1PRO
SIMATIC NET SCALANCE W788-2PRO
SIMATIC NET SCALANCE W788-1RR
SIMATIC NET SCALANCE W788-2RR

SIMATIC NET SCALANCE W744-1PRO
SIMATIC NET SCALANCE W746-1PRO
SIMATIC NET SCALANCE W747-1RR

in the version put into circulation by Siemens AG conform to the regulations of the following European directive:

- 99/5/EC
  Directive of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity. Conformity with the basic requirement of the directive is attested by adherence to the following standards:
- EN 60950-1
  Information technology equipment - Safety - Part 1: General requirements
- EN 301489-1 V1.9.2
  Electromagnetic compatibility and radio spectrum matters (ERM) - Electromagnetic compatibility for radio equipment and services - Part 1 : Common technical requirements (V1.9.2).
- EN 301489-17 V2.2.1
  Electromagnetic compatibility and radio spectrum matters (ERM) - Electromagnetic compatibility for radio equipment and services - Part 17: Specific conditions for 2.4 GHz broadband transmission systems and 5 GHz high performance RLAN equipment
- EN 300328 V1.7.1
  Electromagnetic Compatibility and Radio Spectrum Matters (ERM); — Broadband transmission systems — Data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques — Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive
- EN 301893 V1.7.1
  Broadband Radio Access Networks (BRAN) - 5 GHz high performance RLAN - Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive

- EN 50385
  Product standard to demonstrate the compliance of radio base stations and fixed terminal stations for wireless telecommunication systems with the basic restrictions or the reference levels related to human exposure to radio frequency electromagnetic fields (110 MHz-40 GHz) - General public
- 1999/519/EC
  Council recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)

Devices connected to the system must meet the relevant safety regulations.

The EC Declaration of Conformity is available for the responsible authorities according to the above-mentioned EC Directive at the following address:

Siemens Aktiengesellschaft
Industry Sector
Postfach 4848
D-90026 Nürnberg

This declaration certifies compliance with the directives named above, but does not guarantee any specific properties.

Note

The specified approvals apply only when the corresponding mark is printed on the product.

ATEX, cULus and FM approvals

The products

SIMATIC NET SCALANCE W788-1PRO
SIMATIC NET SCALANCE W788-2PRO
SIMATIC NET SCALANCE W788-1RR
SIMATIC NET SCALANCE W788-2RR

SIMATIC NET SCALANCE W744-1PRO
SIMATIC NET SCALANCE W746-1PRO
SIMATIC NET SCALANCE W747-1RR

have the following approvals

- EN 60079-15:2005
  EN 60079-0:2006
  II 3 G Ex nA II T..
  KEMA 07 ATEX 0145X
- c-UL-us:
  UL 60950-1 CSA C22.2 No. 60950-1
- c-UL-us for hazardous location*:
  ISA 12.12.01-2000, CSA C22.2 No. 213-M1987
  CL. 1, Div. 2 GP. A.B.C.D T..
  CL. 1, Zone 2, GP, IIC, T..
  CL. 1, Zone 2, AEx nC IIC T..

- FM 3611 Hazardous (Classified) Location Electrical Equipment:
  Non Incendive / Class I / Division 2 / Groups A,B,C,D / T* and
  Non Incendive / Class I / Zone 2 / Group IIC / T*

(T.. / T* = For detailed information on the temperature class, refer to the type plate)

Other approvals

The products

SIMATIC NET SCALANCE W788-1PRO
SIMATIC NET SCALANCE W788-2PRO
SIMATIC NET SCALANCE W788-1RR
SIMATIC NET SCALANCE W788-2RR

SIMATIC NET SCALANCE W744-1PRO
SIMATIC NET SCALANCE W746-1PRO
SIMATIC NET SCALANCE W747-1RR

meet the stipulations of the following directives or standards:

- Directive 72/245/EC, last changed by directive 2006/28/EC
  Type approval number e1*72/245*2006/28*5328*00
  E1: Number of the approval 035328, extension no. 01
- EN 50155 (VDE 0115 Part 200, March 2008)

Note

The specified approvals apply only when the corresponding mark is printed on the product.

Certification ID

The following table shows the product names and the corresponding certification ID:

Type	Number of supported IP nodes	Number of supported MAC nodes	iPCF mode	Certification ID Order no. Order no. US variant
W788-1PRO	Multiple	Multiple	No	**RAP-W1-RJ-E1** 6GK5788-1AA60-2AA0 6GK5788-1AA60-2AB0
W788-2PRO	Multiple	Multiple	No	**RAP-W2-RJ-E2** 6GK5788-2AA60-2AA0 6GK5788-2AA60-2AB0
W788-1RR	Multiple	Multiple	Yes	**RAP-W1-RJ-E1** 6GK5788-1AA60-6AA0 6GK5788-1AA60-6AB0
W788-2RR	Multiple	Multiple	Yes	**RAP-W2-RJ-E2** 6GK5788-2AA60-6AA0 6GK5788-2AA60-6AB0
W744-1PRO	1	1	No	**RAP-W1-RJ-E1** 6GK5744-1AA60-2AA0 6GK5744-1AA60-2AB0
W746-1PRO	Multiple	Multiple	No	**RAP-W1-RJ-E1** 6GK5746-1AA60-4AA0 6GK5746-1AA60-4AB0
W747-1RR	Multiple	Multiple	Yes	**RAP-W1-RJ-E1** 6GK5747-1AA60-6AA0 6GK5747-1AA60-6AB0

SIEMENS

Declaration of Conformity

Manufacturer / responsible person	Alfred Hümmer
Address:	Siemens AG
	I IA SC CI
	Gleiwitzer Str. 555
	90475 Nuremberg
	Germany

Declares that the product:

type:	Industrial WLAN Access Point RAP Family
model:	**RAP-W1-RJ-E1** **RAP-W2-RJ-E2**
Intended use	Wireless Communication

Complies with the essential requirements of Article 3 of the R&TTE 1999/5/EC Directive, if used for its intended use and that the following standards has been applied:

1. Safety (Article 3.1.a of the R&TTE Directive)

Applied standard(s)	issue
EN 60950-1	**2006 + A11:2009 + A1:2010 + A12:2011 + AC:2011**

2. Electromagnetic compatibility (Article 3.1.b of the R&TTE Directive)

Applied standard(s)	issue
EN 301489-1 V1.9.1	**2011-04**
EN 301489-17 V2.2.1	**2012-09**

3. efficient use of the radio frequency spectrum (Article 3.2 of the R&TTE Directive)

Applied standard(s)	issue
EN 300 328 V1.7.1	**2006-10**
EN 301 893 V1.7.1	**2012-06**

4. Health (Article 3.1a of the R&TTE Directive)

Applied standard(s)	issue
EN 50385	**2002**
1999/519/EC	

Siemens Aktiengesellschaft

Nuremberg, 05. June 2013
(Place and Date)

i. V. Thomas Grötschel

i. V. Alfred Hümmer

FCC approval

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Notice

Changes or modifications made to this equipment not expressly approved by SIEMENS may void the FCC authorization to operate this equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notice

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Professional Installation Notice:

To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

Note

In the USA, the "ANT793-8DN" antenna is approved only for wireless mode 802.11a!

Note

The specified approvals apply only when the corresponding mark is printed on the product.

RSS-210 of Industry Canada

"Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

"This device has been designed to operate with the antennas listed below*, and having a maximum gain of 18 dBi. Antennas not included in this list or having a gain greater than 18 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms."

"To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication."

"That the device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems."

"Users should also be cautioned to take note that high power radars are allocated as primary users (meaning they have priority) of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices."

* For more detailed information on the approved antennas, refer to the section "Technical specifications".

Note

In Canada, the "ANT793-8DN" antenna is approved only for wireless mode 802.11a!

Note

The specified approvals apply only when the corresponding mark is printed on the product.

NCC Warning Statement (Taiwan)

Article 12
Without permission, any company, firm or user shall not alter the frequency, increase the power, or change the characteristics and functions of the original design of the certified lower power frequency electric machinery.

Article 14
The application of low power frequency electric machineries shall not affect the navigation safety nor interfere a legal communication, if an interference is found, the service will be suspended until improvement is made and the interference no longer exists.

Note

The "ANT793-8DN" antenna is not approved in Taiwan!

Note

The specified approvals apply only when the corresponding mark is printed on the product.

KCC Statement (Republic of Korea)

사용자안내문(제5조제1항제1호관련)

기종별	사용자안내문
A 급 기기 (업무용 방송통신기기)	이 기기는 업무용(A 급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

"당해 무선설비는 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없음"

Note

The specified approvals apply only when the corresponding mark is printed on the product.

Notes on approval in Mexico

Certification ID	Certification number
RAP-W1-RJ-E1	RCPSIRA08-0712
RAP-W2-RJ-E2	RCPSIRA08-0712-A1

Notes on approval in Argentina

Certification ID	Certification number
RAP-W1-RJ-E1	CNC:C-6880
RAP-W2-RJ-E2	CNC:C-6883

Note on approval in Bahrain

The operator/owner of this device must comply with the 2.4 GHz and 5 GHz Frequency Licensing Regulation and technical specifications, and must also obtain the necessary licenses in order to use these frequencies in accordance with the Telecommunications Law (refer to section 43 and 44).

Notes on approval in Brazil

Note

The specified approvals apply only when the corresponding mark is printed on the product.

7.2 National approvals

National approvals

The following table lists the countries in which the SCALANCE W700 product is approved. The diamond symbol (♦) identifies all countries for which there was no approval at the time these operating instructions were written.

The current status of the approvals can be found on the Internet at the following address:

Http://www.siemens.com/funkzulassungen

Column	Meaning
Country	Country
Mode	IEEE 802.11 standard and the TPC and / or DFS functionality, where required
CH	Channel
MHz	Frequency
PWR (EIRP)	Maximum permitted effective isotropic radiated power
Use	Permitted use indoors and / or outdoors

Country	Mode	CH	MHz	PWR (EIRP)	Use
Egypt	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
		149 - 165	5745 - 5825	200 mW	Indoor + outdoor
	11h DFS+TPC	52 - 64	5260 - 5320	200 mW	Indoor only
Angola	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 116	5500 - 5580	1000 mW	Indoor + outdoor
		132 - 140	5660 - 5700	1000 mW	Indoor + outdoor
Argentina	11b 11g	1 - 13	2412 - 2472	1000 mW	Indoor + outdoor
	11a TPC	52 - 64	5260 - 5320	250 mW	Indoor + outdoor
		149 - 161	5745 - 5805	1000 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
Australia	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
	11a Turbo	42	5210	50 mW	Indoor only
	TPC	50 58	5250 5290	200 mW	Indoor only
		152 160	5760 5800	1000 mW	Indoor + outdoor
Bahrain	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
Brazil	11b 11g 11g Turbo	1 - 13	2412 - 2472	400 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
Chile	11b	1 - 13	2412 - 2472	100 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	100 mW	Indoor only
		149 - 165	5745 - 5825	100 mW	Indoor only
	11h Turbo DFS+TPC	42	5210	100 mW	Indoor only
		50 58	5250 5290	100 mW	Indoor only
		152 160	5760 5800	100 mW	Indoor only
China	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	149 - 165	5745 - 5825	1000 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
Belgium Bulgaria Denmark Germany Estonia Finland France Greece Great Britain Ireland Iceland Italy Latvia Liechtenstein Lithuania Luxembourg Malta Netherlands Norway Austria Poland Portugal Romania Sweden Switzerland Slovakia Slovenia Spain Czech Republic Hungary Cyprus CE	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 116	5500 - 5580	1000 mW	Indoor + outdoor
		132 - 140	5660 - 5700	1000 mW	Indoor + outdoor
Hong Kong OFTA 電訊管理局	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 116	5500 5580	1000 mW	Indoor + outdoor
		132 - 140	5660 5700	1000 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
India	11b 11g	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		149 - 165	5745 - 5825	200 mW	Indoor only
Japan	11b	1 - 14	2412 - 2484	100 mW	Indoor + outdoor
	11g	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	184 - 196	4920 - 4980	200 mW	Indoor + outdoor
		8 12 16	5040 5060 5080	200 mW	Indoor + outdoor
		36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	100 - 140	5500 - 5700	200 mW	Indoor + outdoor
Canada	11b 11g	1	2412	200 mW	Indoor + outdoor
		2 - 10	2417 - 2457	1000 mW	Indoor + outdoor
		11	2462	200 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
	11a Turbo	42	5210	200 mW	Indoor only
	TPC	152 160	5760 5800	1000 mW	Indoor + outdoor
	11h DFS+TPC	52 - 64	5260 - 5320	200 mW	Indoor + outdoor
		100 - 140	5500 - 5700	200 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
Columbia	11b 11g	1	2412	200 mW	Indoor + outdoor
		2 - 10	2417 - 2457	1000 mW	Indoor + outdoor
		11	2462	200 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
	11a Turbo TPC	152 160	5760 5800	1000 mW	Indoor + outdoor
Croatia	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 140	5500 - 5700	1000 mW	Indoor + outdoor
Kuwait	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a	36 - 48	5180 - 5240	200 mW	Indoor + outdoor
	11h	52 - 64	5260 - 5320	200 mW	Indoor + outdoor
Malaysia	11b 11g	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	56 60 64	5280 5300 5320	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
Macedonia	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 116	5500 - 5580	1000 mW	Indoor + outdoor
		132 - 140	5660 - 5700	1000 mW	Indoor + outdoor
Mexico	11b 11g 11g Turbo	1 - 11	2412 - 2462	500 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor + outdoor
		52 - 64	5260 - 5320	1000 mW	Indoor + outdoor
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
	11a Turbo TPC	152 160	5760 5800	1000 mW	Indoor + outdoor
Mozambique	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 116	5500 - 5580	1000 mW	Indoor + outdoor
		132 - 140	5660 - 5700	1000 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
Peru	11b 11g 11g Turbo	1	2412	200 mW	Indoor + outdoor
		2 - 10	2417 - 2457	1000 mW	Indoor + outdoor
		11	2462	200 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
Russia	11b 11g	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	50 mW	Indoor + outdoor
		52 - 64	5260 - 5320	250 mW	Indoor + outdoor
		100 - 140	5500 - 5700	1000 mW	Indoor + outdoor
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
Saudi Arabia	11b 11g 11 g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
Serbia	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 116	5500 - 5580	1000 mW	Indoor + outdoor
		132 - 140	5660 - 5700	1000 mW	Indoor + outdoor
Singapore	11b 11g	1 - 13	2412 - 2472	100 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor + outdoor
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
	11h DFS+TPC	52 - 64	5260 - 5320	200 mW	Indoor + outdoor
	11h Turbo DFS+TPC	42 50 58	5210 5250 5290	100 mW	Indoor + outdoor
		152 160	5760 5800	100 mW	Indoor + outdoor
South Africa	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	60 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 116	5500 - 5580	1000 mW	Indoor + outdoor
		132 - 140	5660 - 5700	1000 mW	Indoor + outdoor
South Korea	11b 11g	1 - 13	2412 - 2472	40 mW (RHS power=10mW /MHz)	Indoor + outdoor
	11a TPC	149 - 161	5745 - 5805	200 mW (RHS power=10mW /MHz)	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
Taiwan	11b 11g 11g Turbo	1	2412	200 mW	Indoor + outdoor
		2 - 10	2417 - 2457	1000 mW	Indoor + outdoor
		11	2462	200 mW	Indoor + outdoor
	11a TPC	56 - 64	5280 - 5320	50 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
	11h DFS+TPC	100 - 140	5500 - 5700	250 mW	Indoor + outdoor
Turkey	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	60 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
Ukraine	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 64	5180 - 5320	200 mW	Indoor + outdoor
Uruguay	11b 11g	1	2412	200 mW	Indoor + outdoor
		2 - 10	2417 - 2457	1000 mW	Indoor + outdoor
		11	2462	200 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
United Arab Emirates	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		100 - 116	5500 - 5580	1000 mW	Indoor only
		132 - 140	5660 - 5700	1000 mW	Indoor only
Venezuela	11b 11g 11g Turbo	1 - 13	2412 - 2472	1000 mW	Indoor + outdoor
	11a TPC	36 - 64	5180 - 5320	200 mW	Indoor only
		149 - 165	5745 - 5825	200 mW	Indoor + outdoor
	11h	52 - 64	5260 - 5320	1000 mW	Indoor + outdoor
United States of America	11b 11g	1	2412	200 mW	Indoor + outdoor
		2 - 10	2417 - 2457	1000 mW	Indoor + outdoor
		11	2462	200 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
		149 - 165	5745 - 5825	1000 mW	Indoor + outdoor
	11a Turbo TPC	152 160	5760 5800	1000 mW	Indoor + outdoor

Country	Mode	CH	MHz	PWR (EIRP)	Use
Vietnam	11b 11g 11g Turbo	1 - 13	2412 - 2472	100 mW	Indoor + outdoor
	11a TPC	36 - 48	5180 - 5240	200 mW	Indoor only
	11h DFS+TPC	52 - 64	5260 - 5320	200 mW	Indoor + outdoor

The following notice applies only to the SCALANCE W786-2HPW:

Note

Before commissioning the SCALANCE W786-2HPW, check that the Hipath Wireless Controller required for operation is also approved in the country of use.