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1 Preface

1.1 Precautions and Safety

Before you handle any equipment you must comply with the safety advices.

Adherence to the safety instructions ensures compliance with the safety requirements as defined in IEC 62368-1 (Safety of audio/video, information and communication technology equipment).

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Please refer to the following document:
[1KHW002497] Operating Instruction “Precautions and safety”.

1.2 Symbols and Notations

This Installation Instruction uses the following symbols:

WARNING

Non-observance can lead to death or injury.
Indicates a hazard with a medium level of risk which, if not avoided, could result in death or injury to the user.
→ Possible actions are given.

NOTICE

Non-observance could result in equipment damage.
Failing to comply with this may result in physical damage.
→ Possible actions are given.

Risk of operating trouble!
Indicates that an action may lead to operating trouble or loss of data.
→ Possible actions are given.

Please note:
Shows significant information.
→ Possible actions are given.

1.3 Interfaces and Circuit Categories

Table 1: Electrical interfaces and circuit categories

Interface	Circuit category according to IEC 62368-1	Max. rating	
		Voltage	Current
Local power supply	ES2	< 72 V_{DC}	< 16 A
Alarm interface FAMO2 and FAMO2-F inputs	ES2	< 72 V_{DC}	< 10 mA
Alarm interface FAMO2 (R3) and FAMO2-F outputs	ES1	< 6 V	< 10 mA

1.4 Target Audience

This Installation Instruction is targeted at persons who are entrusted with the installation of the system.

The persons targeted are

- the installation personnel, and/or
- the provisioning personnel, and/or
- the decommissioning personnel.

Please note:
Only instructed or skilled persons as per IEC 62368-1 may install and maintain the system.

2 Preparing for Installation

2.1 Installation General Instructions

2.1.1 Selection of the Installation Site

To get the best performance and MTTF with your FOX612 equipment you should consider the following aspects for the selection of the installation site:

Please note:
Avoid sites with important differences between the daily maximum and the nightly minimum temperature (except for cabinets with air conditioning).

→ For FOX612 installed in cabinets or similar, select sites for the cabinets which are not permanently exposed to direct sun radiation.

Please note:
Operation at lower temperatures extends the long-term reliability (MTTF) and the lifetime of the equipment.

→ Check for temperature and relative humidity within the specified range.

NOTICE

Attention to temperature range. Risk of equipment damage!
High ambient temperatures caused by other equipment may lead to overheating of the FOX612 and may cause damage to the FOX612.

→ Do not install the FOX612 near or on top of equipment that dissipates heat.

NOTICE

Attention to temperature range. Risk of equipment damage!
Obstructed airflow may lead to overheating and damage of your FOX612.

→ Make sure that the selected installation allows the equipment to dissipate the heat created within the FOX612.

NOTICE

Attention to access control. Risk of equipment damage!
Unrestricted access to equipment premises hold a risk of damaged equipment and disrupted services.

→ Select a dust-free room that is normally closed and not generally accessible.

Risk of operating trouble!

Attention to EMC properties!
Electronic equipment is sensitive to strong electromagnetic fields and may show unexpected behavior when exposed to fields above the specified level.

→ Select an installation place with sufficient distance to equipment that produces strong electromagnetic fields (e.g. large transformers, power rectifiers, generators, electrical machines, railways etc.).

WARNING Attention to proper earthing. Risk of electric shock!

Improper earthing of the equipment carries a high risk that could result in serious injury, and that could damage your equipment.

→ Make sure that the selected site provides efficient earthing terminals, and that the FOX612 is properly connected to earth. Only proper earthing of the equipment will protect you and your equipment from lightning.

A carefully chosen installation site is the first step to reliable and error-free system operation.

2.1.2 Options for Installation

The FOX612 and its installation have several options that you should consider for the planning and preparation of the equipment installation:

2.1.2.1 Standard Options

- Adapter for installation in ETSI racks.
- Adapter for wall installation.
- Air filter.

If ordered, the above accessories are packed together with the subrack and cable tray in the FOX612 packaging.

2.1.2.2 Non-standard Options

- DUPF2

  The DUPF2 is a dual power supply interface for the FOX612 subrack that allows you to feed the FOX612 with power from 2 separate power supply circuits. The DUPF2 is separately ordered and has its own packaging.
- Fan unit (FAMO2 option)

  The FAMO2 is the fan unit for the FOX612 subrack providing active cooling.

  Note that there are FOX612 units for which active cooling is mandatory. Please refer to [1KHW002464] User Manual “FOX615 R2/FOX615/FOX612/FOX611”.

  The FAMO2 can be separately ordered and has its own packaging.
- Alarm unit (FAMO2-F option)

  The FAMO2-F is the alarm unit for the FOX612 operated without active cooling, i.e. without the FAMO2 unit. The alarm unit provides the same alarm interfaces as the fan unit FAMO2 (R3).

  The FAMO2-F is separately ordered and has its own packing.

Although possible, a later rearrangement of the installation for the above options creates additional work and service interruptions.

2.2 Planning Guidelines

2.2.1 Power Supply Principles

It is essential to design and implement the DC power supply before the installation of the equipment.

The installation of the power supply for the FOX612 requires a local power distribution for the individual NEs and a corresponding fusing for each NE. It is a good practice to start the installation of the FOX612 only after the implementation of the power supply and fuses or circuit breakers in the power supply circuits.

The FOX612 is designed for single or dual DC power supply:

- Standard power supply (1 power supply circuit, PSC1):

  The cable tray carries the plug socket with the external power supply circuit and provides the power connection point for the FOX612 subrack.
- Power supply with DUPF2 (2 power supply circuits, PSC1 and PSC2):

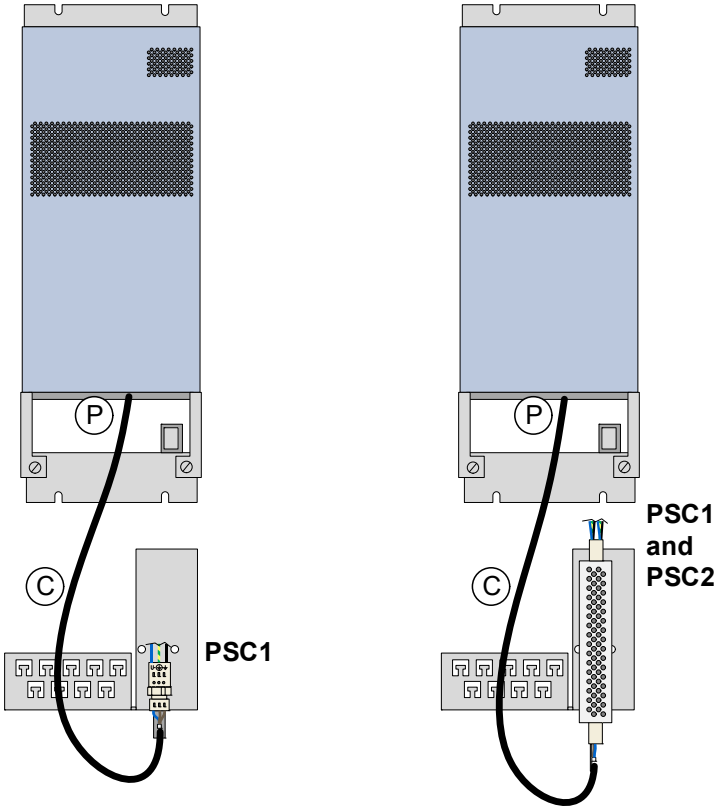
  The cable tray carries the DUPF2 multi-functional connection box with two plug sockets for the external power supply circuits. The DUPF2 provides the power connection point for the FOX612 subrack.

It is possible to upgrade an installation from single to dual power supply.

The FOX612 subrack provides an internal connection point (“P” in the figures below) for the power supply with

- 1 connection point for the U_T (-48/-60 V_{DC}) conductor,
- 2 connection points for the 0 V conductor and system ground (subrack construction).

The short cable “C” connects the connection point “P” of the subrack to the power connection point for the external power supply circuit(s) on the FOX612 cable tray.



Single power supply Dual power supply with DUPF2

Figure 1: FOX612 power supply

For details of the DUPF2, including installation procedures, refer to section 3.4.2 Installing the Dual Power Supply Unit DUPF2 (Option) (on page 38).

2.2.2 Power Supply Circuits

2.2.2.1 Power Distribution

The power supply circuits for the FOX612 power supply can be

- directly connected to the remote DC power distribution point:

  Each remote power distribution point has its own circuit breaker to fuse the supply circuit up to the FOX612 subrack. The circuit breaker is also used as a disconnect device for the subrack.

  This rack wiring diagram, without the remote DC power distribution point, is shown on the left side of Figure 2.

- connected to a power connection block in the rack.

  The power distribution points for all the equipment in the rack are implemented in the rack. Each power distribution point has its own circuit breaker “CB 1” to fuse the supply circuit up to the FOX612 subrack. The circuit breaker is also used as a disconnect device for the subrack.

  This rack wiring diagram is shown on the right side of Figure 2.

For single power supply of the FOX612 only the power supply circuit “PSC_1” is implemented. For dual power supply with the DUPF2 the power supply circuits “PSC_1” and “PSC_2” are implemented.

For details of the DUPF2 installation, refer to section 3.4.2 Installing the Dual Power Supply Unit DUPF2 (Option) (on page 38).

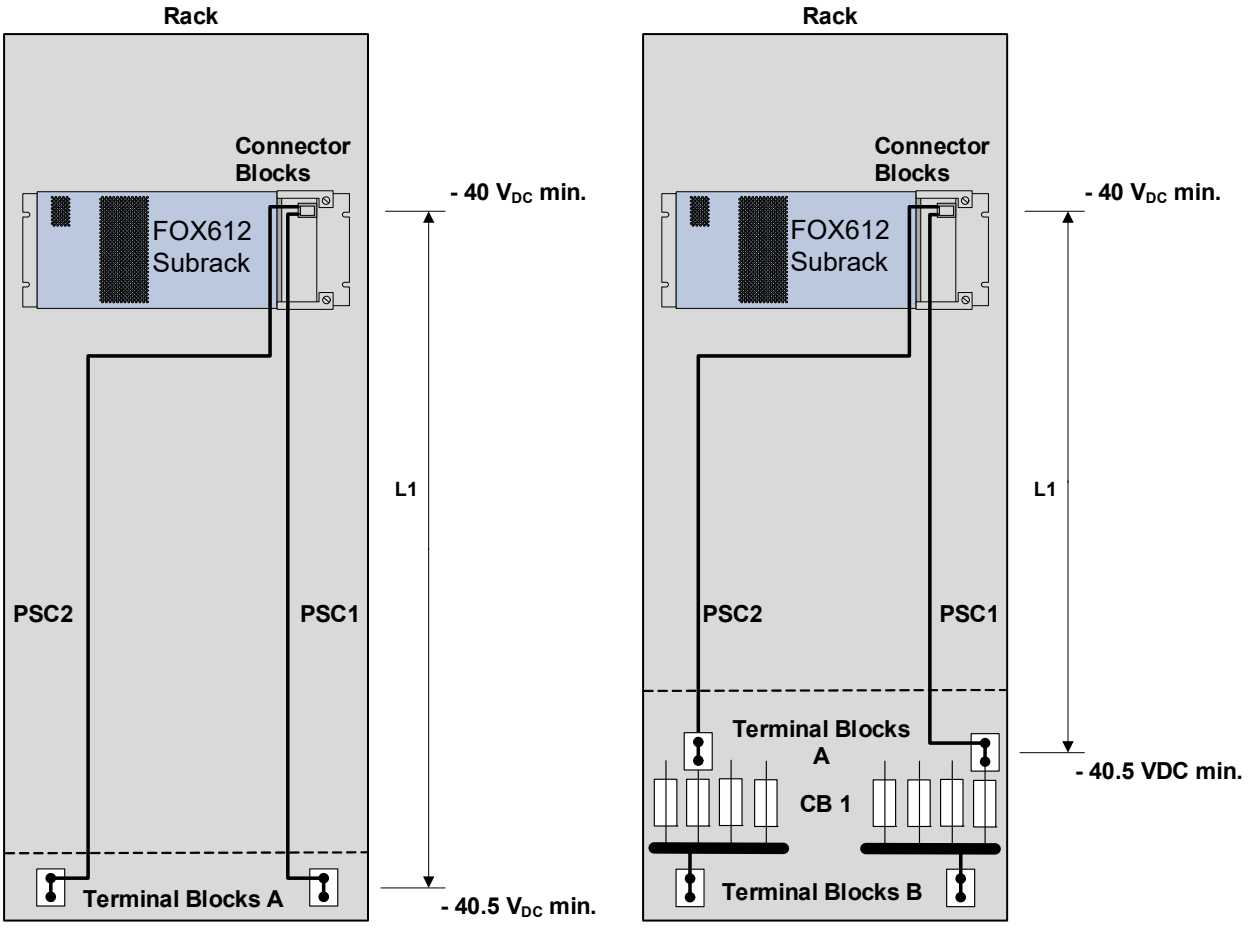


Figure 2: FOX612 power distribution

Legend:

PSC1: Power Supply Circuit 1

PSC2: Power Supply Circuit 2

CB 1: Circuit Breaker 1

L1: Length of the Power Supply Circuit

2.2.2.2 Wire Gauge

The high power capabilities of the FOX612 imply requirements on the minimum cross sections of the supply circuits. To specify the minimum cross sections of the supply circuits PSC1 and PSC2 it has to be considered that

- the voltage at the terminal blocks A according to EN 300 132-2 must be ≥ |40.5 V_{DC}|.
- the voltage at the FOX612 plug sockets for safe operation must be
  - ≥ |40 V_{DC}| with DUPF2, the voltage drop on PSC must be ≤ 0.5 V.
  - ≥ |39.5 V_{DC}| without DUPF2, the voltage drop on PSC must be ≤ 1.0 V.
- the FOX612 plug sockets accept cross sections of up to 2.5 mm^2 for conductors of the PSC circuits.
- the maximum current rating for the FOX612 is 15 A.

The minimum wire gauge required for the conductors of the power supply lines (for one FOX612) between the terminal blocks A and the FOX612 subrack is 1.5 mm^2.

Risk of operating trouble!
Attention to EMC properties!
Please note that the power feeding and returning wires must be arranged in such way that the magnetic induction is kept low.
→ Power cables with low inductivity are commercially available.

2.2.2.3 Circuit Breakers

It is essential to fuse each power supply circuit (-V_{BAT} = -48/-60 V_{DC}) for each FOX612 subrack at the power source side with a 16 A thermal-magnetic circuit breaker (CB 1 in Figure 2: "FOX612 power distribution" (on page 7)) or a 16 A slow-blow fuse.

WARNING **Hazardous electric currents. Risk of flashover and electric shock!**
Omitting the fuses or circuit breakers in the power supply circuit might lead to seriously damaged equipment or create a fire in the case of overload or short circuits.
→ Make sure that the fuses or circuit breakers are correctly installed and intact for each of the power supply circuits.

2.2.3 Heat Evacuation and Installation

2.2.3.1 Units and Heat Dissipation

Traffic units operated in the FOX612 subrack can dissipate a high amount of heat. To evacuate the heated air from the subrack, a passive or active cooling can be used.

Passive cooling, i.e. without a fan unit, requires the deployment of specific functional units. The maximum ambient temperature is reduced compared to the actively cooled subrack. Please refer to [1KHW002464] User Manual “FOX615 R2/FOX615/FOX612/FOX611” for the list of passive cooling FOX612 units.

NOTICE **Attention to temperature range. Risk of equipment damage!**
Passive cooling with the horizontally mounted FOX612 subrack is not possible.
→ A horizontally mounted FOX612 subrack requires active cooling with a fan unit.

Active cooling, i.e. with a fan unit, requires the deployment of a subrack specific fan unit FAMO2.

For reliable operation of the FOX612, it is essential to evacuate the heat from the FOX612 subrack and from its environment.

2.2.3.2 Subrack

The ambient temperature for operation of the FOX612 with active cooling is rated from -25°C to +65°C with a relative humidity of up to 95% (non-condensing).

The ambient temperature for operation of the FOX612 with passive cooling is rated from -25°C to +55°C with a relative humidity of up to 95% (non-condensing).

For detailed specification of the temperature range for FOX612 operation and related operational conditions, refer to [1KHW002460] System Description “FOX61x”.

NOTICE **Attention to temperature range. Risk of equipment damage!**

It is essential to preserve the system specifications and to prevent the system from overheating.

→ The site of installation must provide an ambient temperature within the specified range at any time.

2.2.3.3 Horizontal Installation

To avoid overheating of the equipment due to inadequate horizontal installation adhere to the following instructions.

- Make sure that the FAMO2 fan unit is installed.
- Do not block the airflow through the subrack and its cards. Keep the left and right side of the subrack clear to allow the air to circulate freely through the subrack.
- Enable free airflow from the top left side of the rack (Figure 3) to evacuate the heated air to evacuate the heated air from the top of the rack.
- Enable free airflow into the right bottom side of the rack to allow cold air (refer to Figure 3) to enter into the rack below the equipment.
- Calculate the maximum expected heat dissipation for your FOX612 subrack. If you plan future upgrades, consider higher power dissipation.
- Design the heat exchange capacity of your installation according to the calculated heat dissipation. Air conditioning might be required.

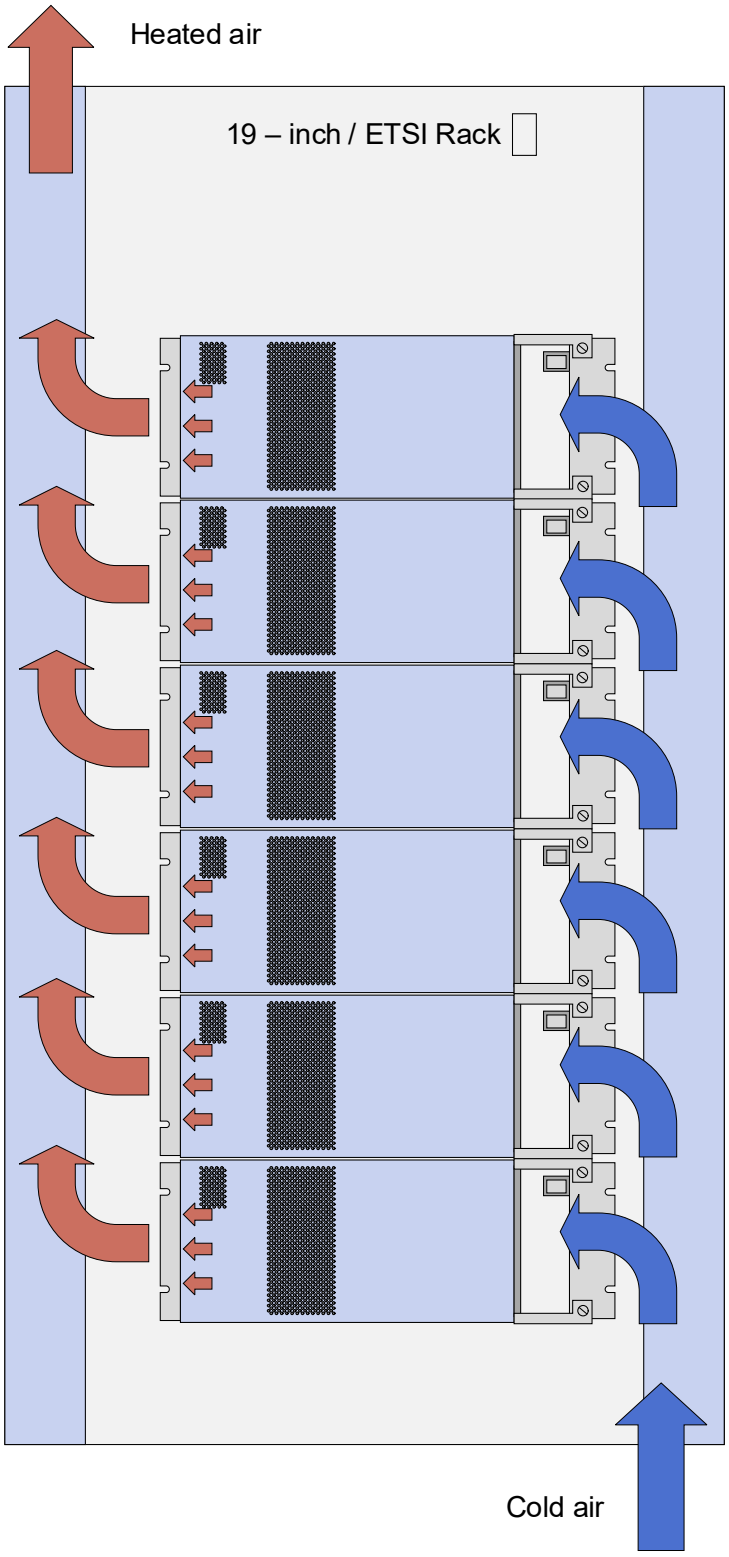


Figure 3: Horizontal installation of stacked FOX612 subracks in 19-inch or ETSI racks

Please note:
The figure above applies for 19-inch and ETSI installations.

Please note:
There is no minimum distance requirement between two adjacent FOX612 unless you want to insert and remove the air filter. If you want to implement such a filter, you have to provide the required space (min. 180 mm) above or below the subrack.

2.2.3.4 Vertical Installation

To avoid overheating of the equipment due to inadequate vertical installation adhere to the following instructions.

- For the passive cooling operation of the FOX612 install the FAMO2-F alarm unit. If no external alarm interfaces are required the alarm unit can be omitted.
- For the active cooling operation of the FOX612 install the FAMO2 fan unit.
- Do not block the airflow through the subrack and its cards. Keep the top and bottom side of the subrack clear to allow the air to circulate freely through the subrack.
- Avoid the installation of other equipment directly above the subrack. Keep a minimum distance of about 2 HU (2 x 44.45 mm) to the equipment above.
- If you stack equipment, install heat deflection shields between the subracks (refer to Figure 4).
- Design the heat exchange capacity of your installation according to the calculated heat dissipation. Additional fan units and/or air conditioning might be required.

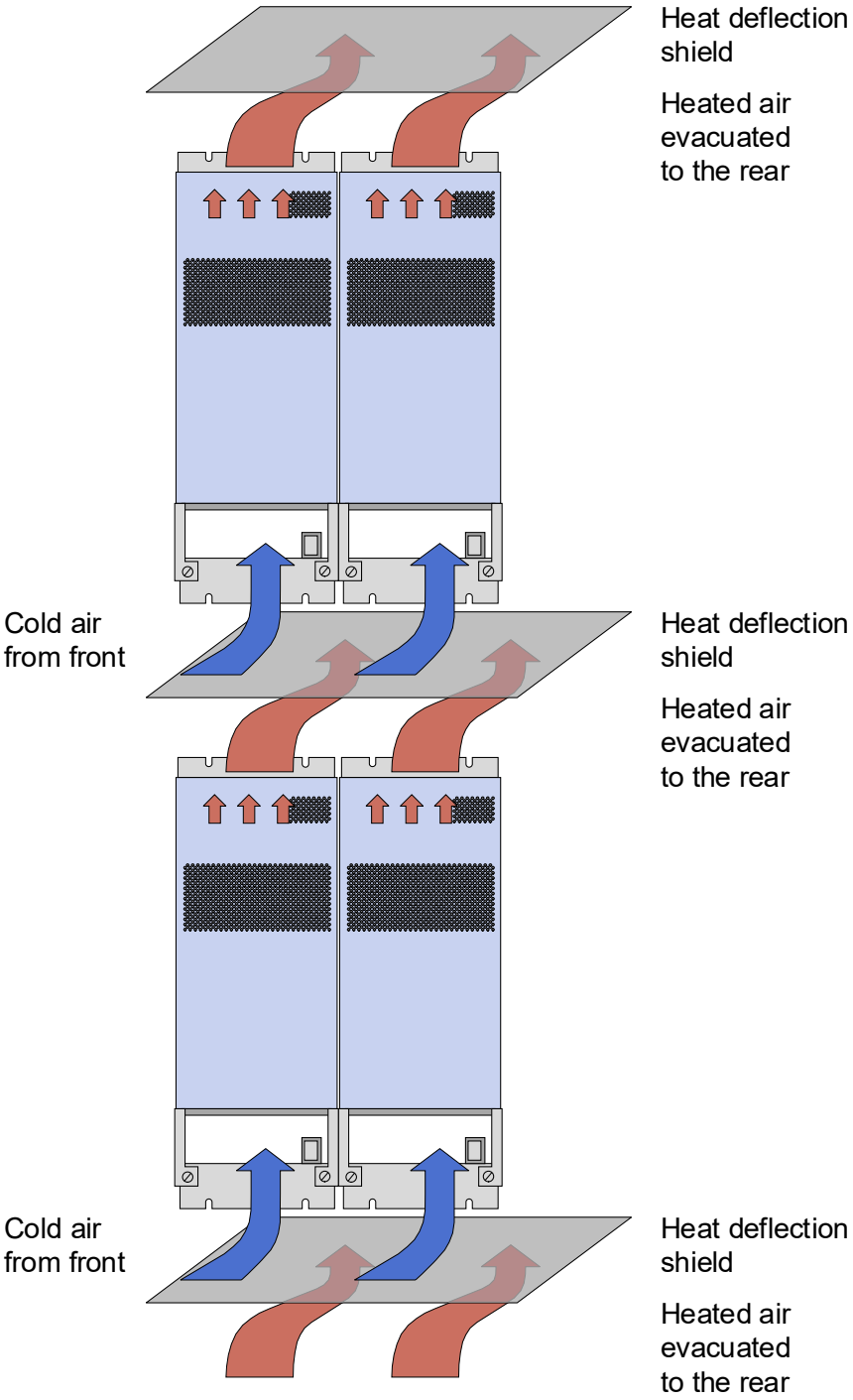


Figure 4: Installation of stacked FOX612 subracks

Please note:
This type of FOX612 installation is not typical for rack installations. In stand racks, the FOX612 is normally mounted horizontally.

→ Hitachi Energy provides no installation material to support this type of FOX612 installation.

Please note:
The installation of stacked subracks in horizontal ETSI racks requires other arrangements, since there is no room for the evacuation of the heated air at the rear of the racks.

2.3 Earthing Principles and Requirements

2.3.1 Earthing and Power Supply

The FOX612 is compliant to telecommunication equipment protection class 1.

The FOX612 is designed for earthing and power supply principles according to ETSI EN 300 253, Figure 2: “Example of a CBN (Common Bonding Network)/MESH-Bonding Network configuration with common DC return conductor connected to the CBN at multiple points”.

For details of the Common Bonding Network principles, refer to ETSI EN 300 253.

In the FOX612 subrack the 0-Volt potential of the (external) power supply is directly connected to the mechanical construction of the subrack and the (internal) electronic ground GND which is fed via the backplane to the units.

The negative power supply voltage U_T (-48/-60 V_{DC}) is first filtered in the subrack. The filtered voltage (U_{TF}) is then fed via the backplane to the units for local conversion.

The subrack requires reliable earthing / bonding to the CBN. The subrack mounting flanges are conductive and provide a conductive contact to the rack if the rails of the rack also provide a conductive surface. If the rack does not provide a conductive surface or is not connected to the CBN, a dedicated earthing / bonding terminal can be used for the subrack earthing via an earthing cable.

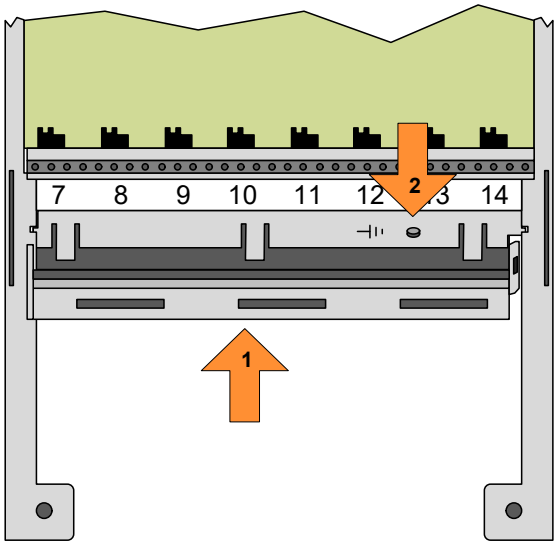


Figure 5: Earthing / bonding terminal of the FOX612 subrack

Legend to Figure 5:

1 Subrack power interface connector terminal (hidden)
- 2 x 0 Volt
- 1 x U_T (-48/-60 V_{DC})

2 Earthing / bonding terminal (4 mm thread)

2.3.2 Lightning and Over-Voltage Protection

The FOX612 **units** provide **secondary over-voltage protection** for their interfaces in cooperation with external equipment.

The **primary protection** (as required for lightning protection) is implemented external to the FOX612, normally at the connection points of the signal cables to the outside world. Depending on the units and interfaces, the implementation of gas discharge tubes at the external connection point is suitable for providing such protection.

WARNING **Hazardous voltages. Risk of electric shock!**

Poor cabling and grounding present a danger to personnel and might lead to seriously damaged equipment.

→ It is mandatory to connect the FOX612 subrack to a suitable protective ground e.g. the Common Bonding Network!

The description of lightning and over-voltage protection is beyond the scope of this installation guide. For more information on the implementation of lightning and over-voltage protection, please refer to [1KHW002463] Installation Instruction “Lightning Protection”.

2.3.3 EMC and ESD Considerations

The FOX612 subrack with the front cover installed represents a Faraday cage like construction. This premises that all signal cables are connected to the cable earthing bar as instructed. Conductive metal sheets all around the subrack protect the FOX612 from ESD and electromagnetic fields.

The 19-inch mounting flanges of the subrack are conductive and provide a conductive contact to the rack if the rails of the rack provide a conductive surface. The subrack provides a terminal for the system earthing.

Risk of operating trouble!

Attention to EMC properties!

In order to preserve the specified EMC characteristics of the FOX612 it is essential to adhere to the following rules:

→ Connect the subrack properly to the system ground.

→ Use (shielded) signal cables that are approved by Hitachi Energy only

→ Connect the shields of the signal cables to the earthing bar of the subrack.

→ Do not modify the ferrite filters provided with the cables.

→ Cover the subrack with its front cover.

Please note:

It is essential to place the ferrite toroid which is close to the unit connector between the earthing bar of the subrack and the connector of the unit.

When in operation, the FOX612 is protected against ESD in accordance with IEC/EN 61000-4-2 and in accordance with the specified EMC properties, provided that

- all parts have been installed as instructed in the technical customer documentation,
- all the equipment is properly grounded,
- the FOX612 subrack is installed with its front cover,
- Hitachi Energy approved cables are used.

  Hitachi Energy gives no warranty for cables manufactured by third party and will not accept liability for EMC/ESD compliance if the FOX612 is operated with cables that are not approved by Hitachi Energy.

NOTICE **Electrostatic discharges. Risk of equipment damage!**

All the plug-in units used with the FOX612 are ESD sensitive units.

→ They must be handled with care.

Respecting the following rules will help you to avoid early equipment damage and is a prerequisite for successful equipment installation and operation:

- The original packaging provides the best protection for your equipment. Leave the equipment in its original packaging until you install it in the subrack.
- Respect ESD protection regulations. To prevent damage of electronic components by electrostatic discharges, wear a grounded protective wrist strap.

2.4 Dimensions and Mechanical Installation Practice

2.4.1 Overview

The FOX612 allows flexible installation in various mechanical environments. To achieve this flexibility, the FOX612 consists of a basic subrack. Sets of adapters provide adaptation of the basic subrack to 19-inch or ETSI racks and for wall mounting.

The FOX612 subrack is equipped with the fan unit FAMO2 or alarm unit FAMO2-F and the optional dual power supply unit DUPF2.

2.4.2 FOX612 Components

2.4.2.1 FOX612 Basic Subrack

The figure below shows the basic FOX612 subrack with the relevant dimensions.

The element to the left (in the figure below) is a multi-purpose angle bracket that is used for rack and wall mounting, depending on the installation. For delivery, the angle bracket is set up for rack mounting.

Figure 6 shows the FOX612 subrack without front cover, and Figure 7 shows the FOX612 subrack with front cover.

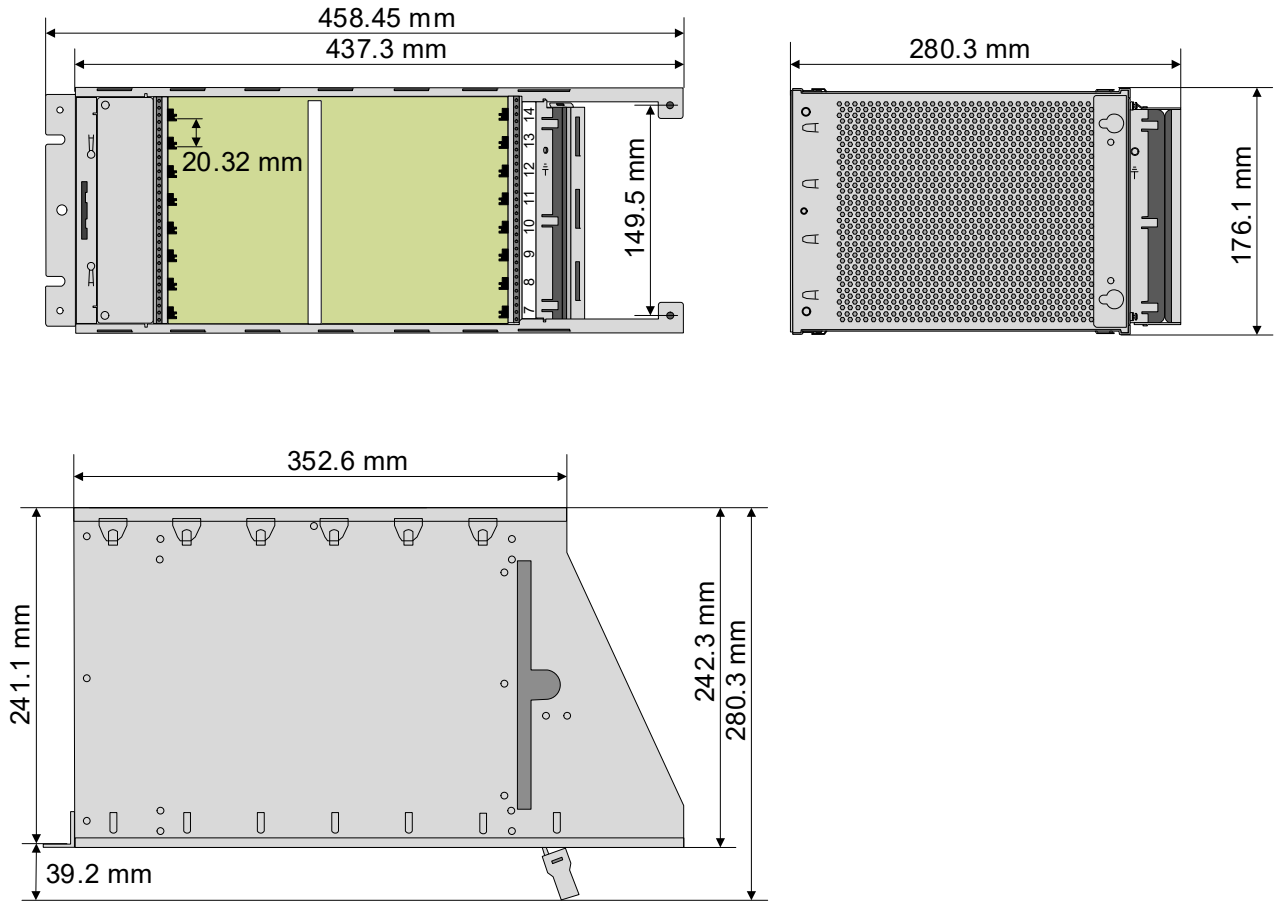


Figure 6: FOX612 subrack without front cover

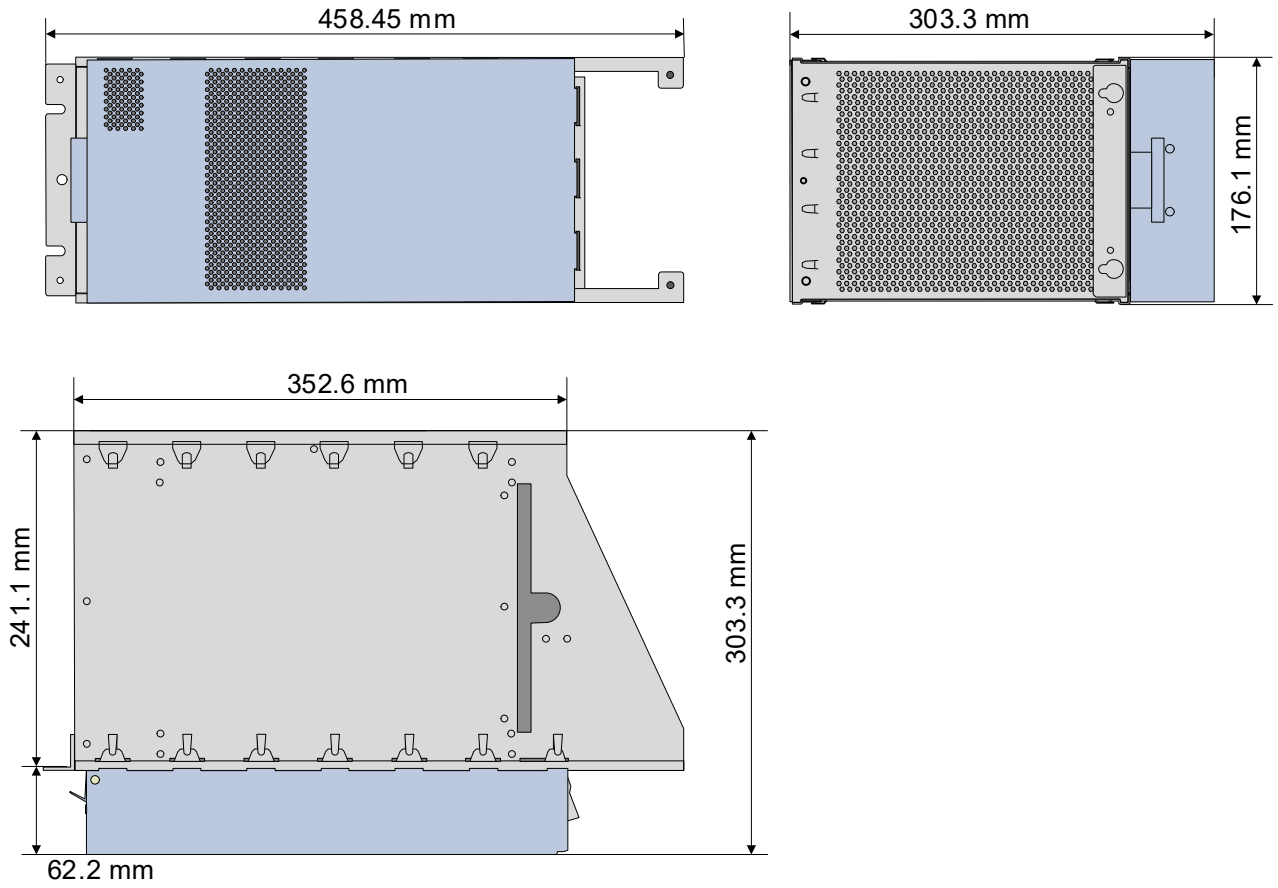


Figure 7: FOX612 subrack with front cover

For the installation of the FOX612, you normally need an adapter or a set of adapters to set up the basic subrack for rack or wall mounting. The adapter provides the cable tray for the signal cables.

2.4.2.2 FAMO2 (Option)

The Figure 8 shows the mechanical dimensions of the FAMO2 (R3) fan unit fitting into the FOX612 subrack.

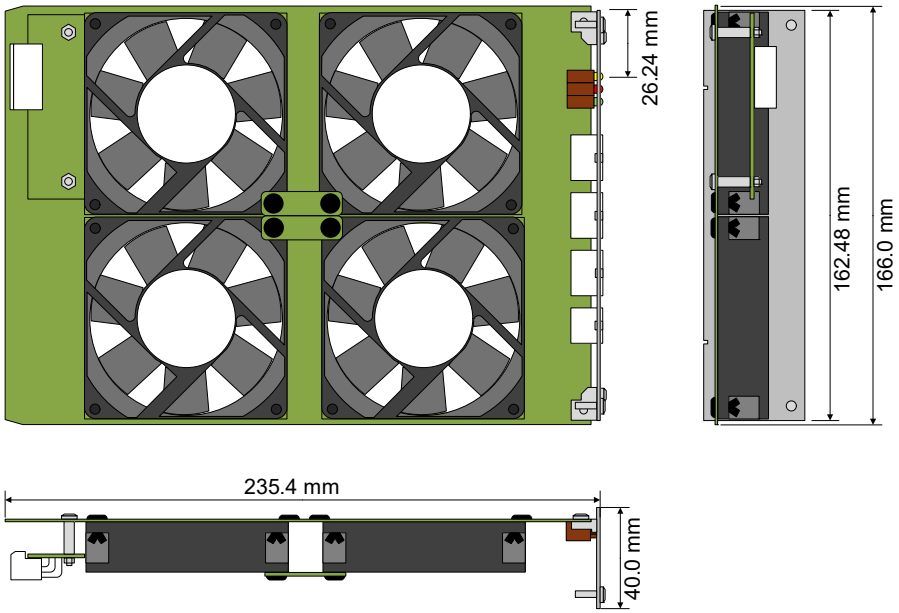


Figure 8: Mechanical dimensions of the FAMO2 R3 fan unit

Please note:
The FAMO2 R2 has no alarm output connector and fans with less height than the FAMO2 R3.

2.4.2.3 FAMO2-F (Option)

The Figure 9 shows the mechanical dimensions of the FAMO2-F alarm unit fitting into the FOX612 subrack.

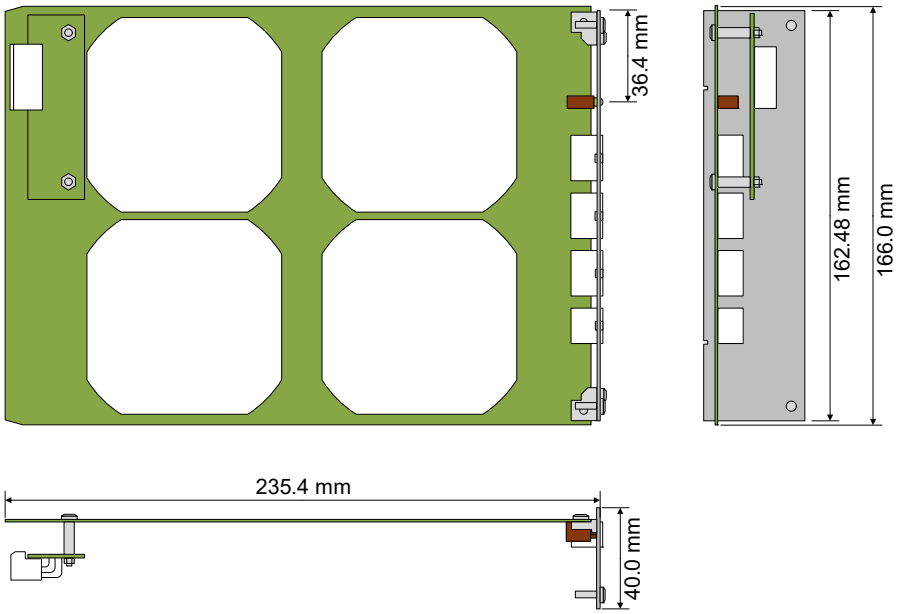


Figure 9: Mechanical dimensions of the FAMO2-F alarm unit

2.4.2.4 DUPF2 (Option)

The Figure 10 shows the mechanical dimensions of the DUPF2 dual power supply connection box (option) fitting to the FOX612 19-inch adapter/cable tray.

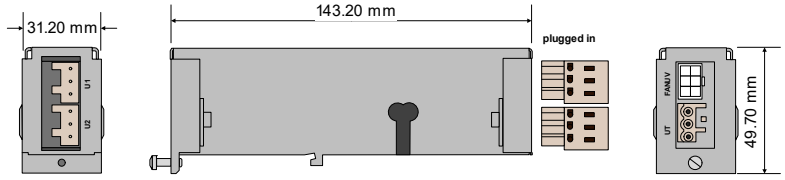


Figure 10: Mechanical dimensions of the DUPF2 dual power supply connection box (option)

The DUPF2 unit is mechanically fixed to the 19-inch adapter/cable tray.

2.4.2.5 19-inch Adapter/Cable Tray

The figure below shows the mechanical dimensions of the 19-inch adapter/cable tray for the FOX612 subrack.

The same 19-inch adapter/cable tray is used for installations with and without DUPF2.

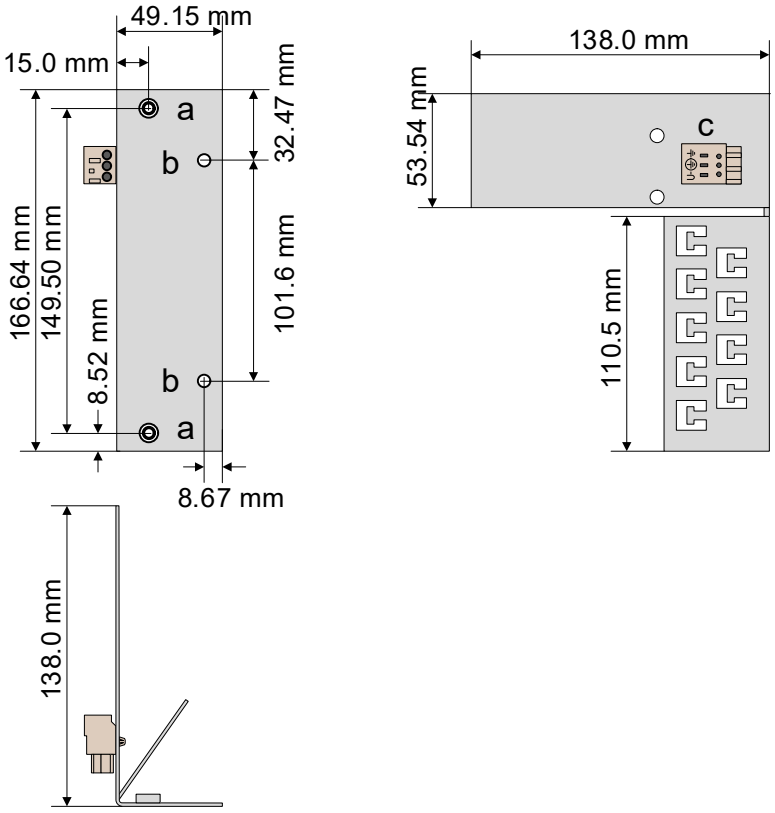


Figure 11: FOX612 19-inch adapter/cable tray

Legend to Figure 11:

a M6 nuts to screw the FOX612 subrack on the 19-inch adapter/cable tray.

b Holes (diameter 6.1 mm) to fix the 19-inch adapter to the 19-inch rack.

c WAGO terminal block (terminal and connector packed with the equipment) to connect the external DC power supply.

Please note:

For details on the installation procedure, refer to section 3.3.2 Installing the 19-inch Adapter/Cable Tray (on page 32).

2.4.2.6 ETSI Adapter Set

The figure below shows the mechanical dimensions of the FOX612 ETSI adapters.

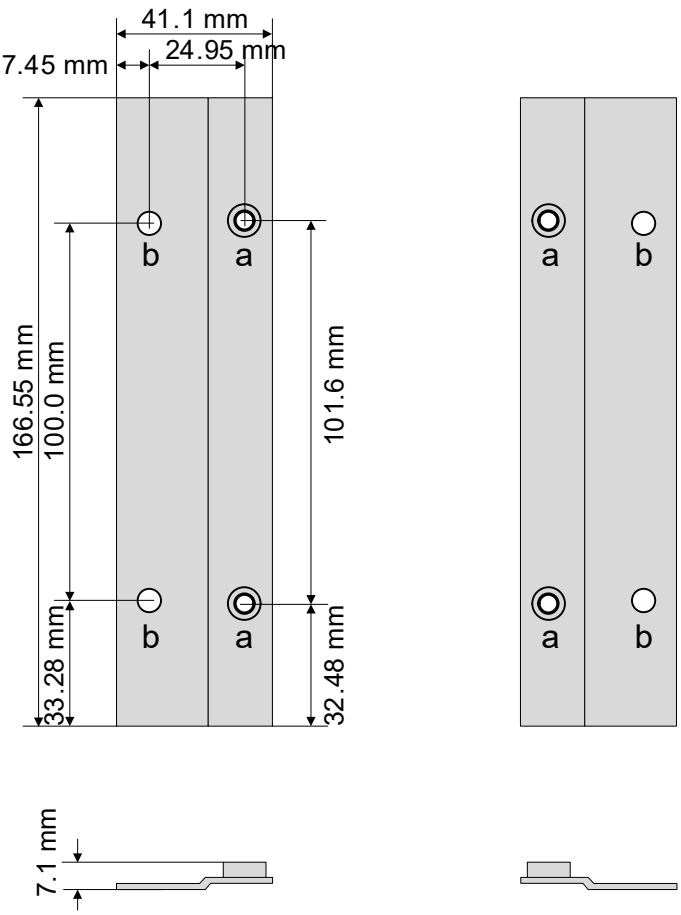


Figure 12: FOX612 ETSI adapter set

Legend to Figure 12:

a M6 nuts to screw the FOX612 subrack (left side) and the 19-inch adapter/cable tray (right side) to the ETSI adapters.

b Holes (diameter 6.5 mm) to fix the ETSI adapters to the ETSI rack.

Please note:
For details on the installation procedure, refer to section 3.3.1 Installing ETSI Adapters (Optional) (on page 31).

2.4.2.7 Wall Mounting Adapter

The figure below shows the mechanical dimensions and layout of the FOX612 wall mounting adapter.

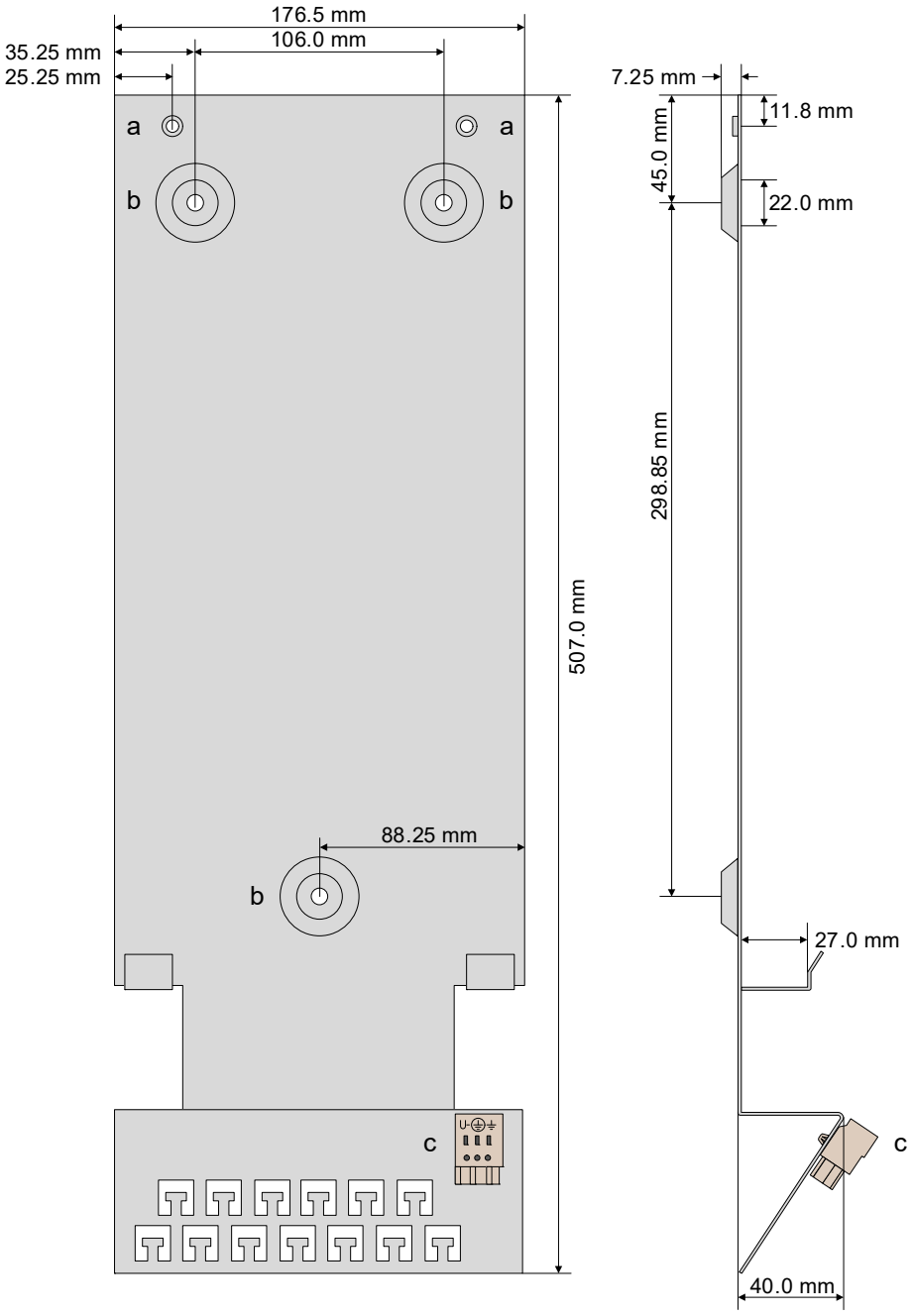


Figure 13: FOX612 wall mounting adapter

Legend to Figure 13:

a M5 nuts to screw the FOX612 subrack (angle bracket rear) to the wall mounting adapter.

b Holes (diameter 6.2 mm) to fix the wall-mounting adapter to the wall or rear panel of a cabinet.
The attaching methods depend on the nature of the wall or rear panel which includes C-shaped rails (e.g. in cabinets). You must select the appropriate screws depending on the attaching.

c WAGO terminal block (terminal and connector packed with the equipment) to connect the external DC power supply.

Please note:
For details on the installation procedure, refer to section 3.3.3 Installing the Wall Mounting Adapter (on page 33).

2.4.3 19-inch Installation Standard

2.4.3.1 Overview

19-inch installation of the FOX612 requires the 19-inch adapter/cable tray.

The angle bracket of the basic FOX612 chassis must be set up in its default (front) position. Two standard M6 screws fix the 19-inch adapter/cable tray from the rear to the flange at the right side of the basic subrack (refer to Figure 14).

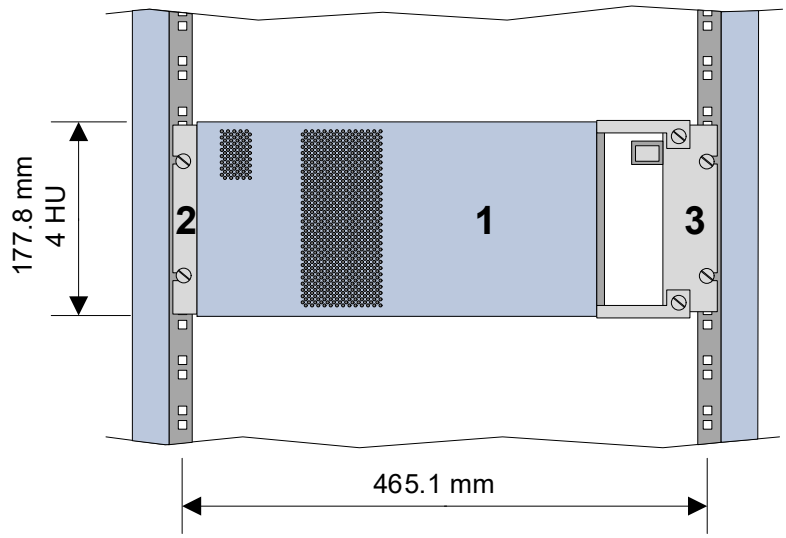


Figure 14: FOX612 and 19-inch installation

Legend to Figure 14:

1 Subrack
2 Angle bracket (fixed with two M4 screws to the FOX612 subrack)
3 19-inch adapter/cable tray

2.4.3.2 Subrack with 19-inch Adapter

The figure below shows the layout and the mechanical dimensions of the FOX612 subrack with 19-inch adaptations.

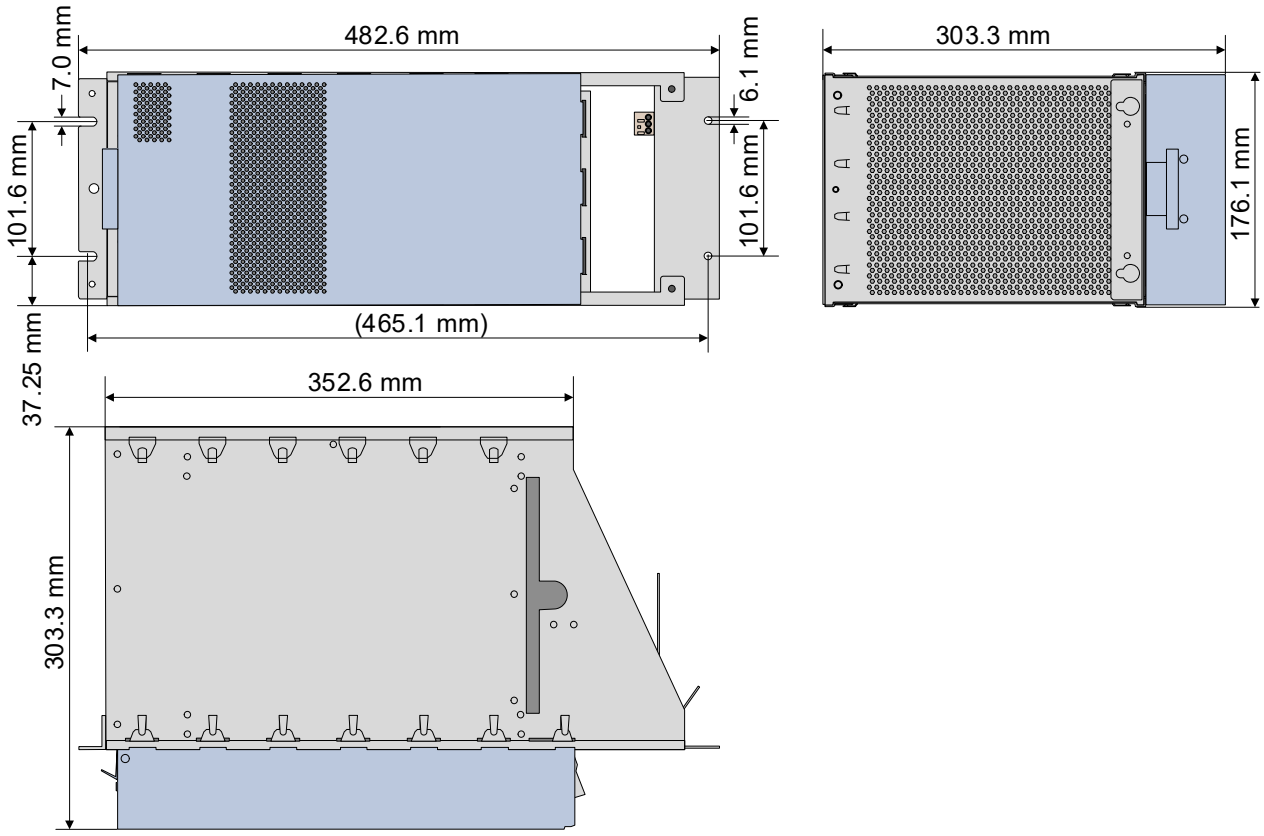


Figure 15: FOX612 subrack with 19-inch adaptation

2.4.4 ETSI Installation Standard

2.4.4.1 Overview

The ETSI installation of the FOX612 relies on an ETSI adapter set, which allows you to install the FOX612 subrack set up for 19-inch installation in an ETSI rack.

The 19-inch adapter/cable tray provides the cable tray for the ETSI installation.

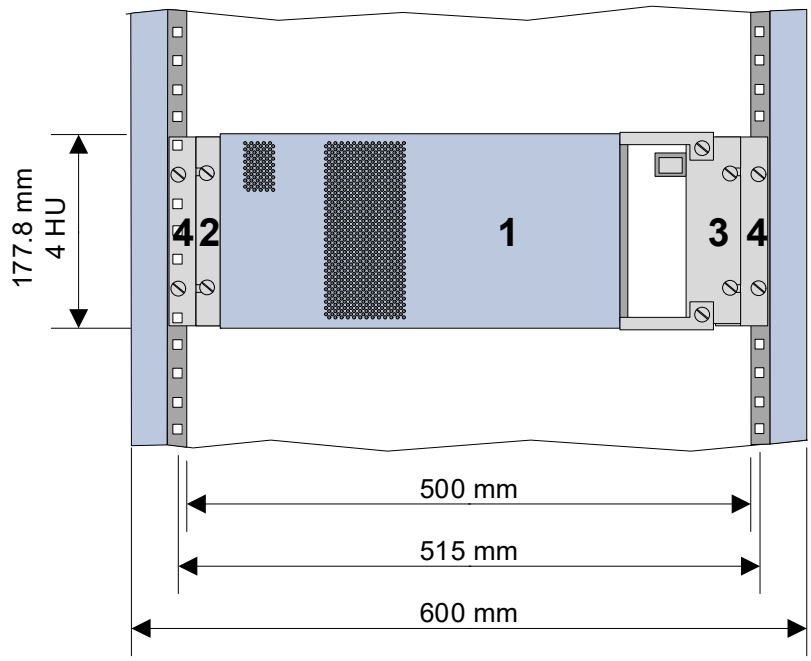


Figure 16: FOX612 and ETSI installation

Legend to Figure 16:

1 Subrack
2 Angle bracket (19-inch) (fixed with 2 M4 screws to the subrack)
3 19-inch adapter/cable tray
4 ETSI adapters

2.4.4.2 Subrack with ETSI Adapters

The figure below shows the layout and the mechanical dimensions of the FOX612 subrack with (19-inch) and ETSI adapters.

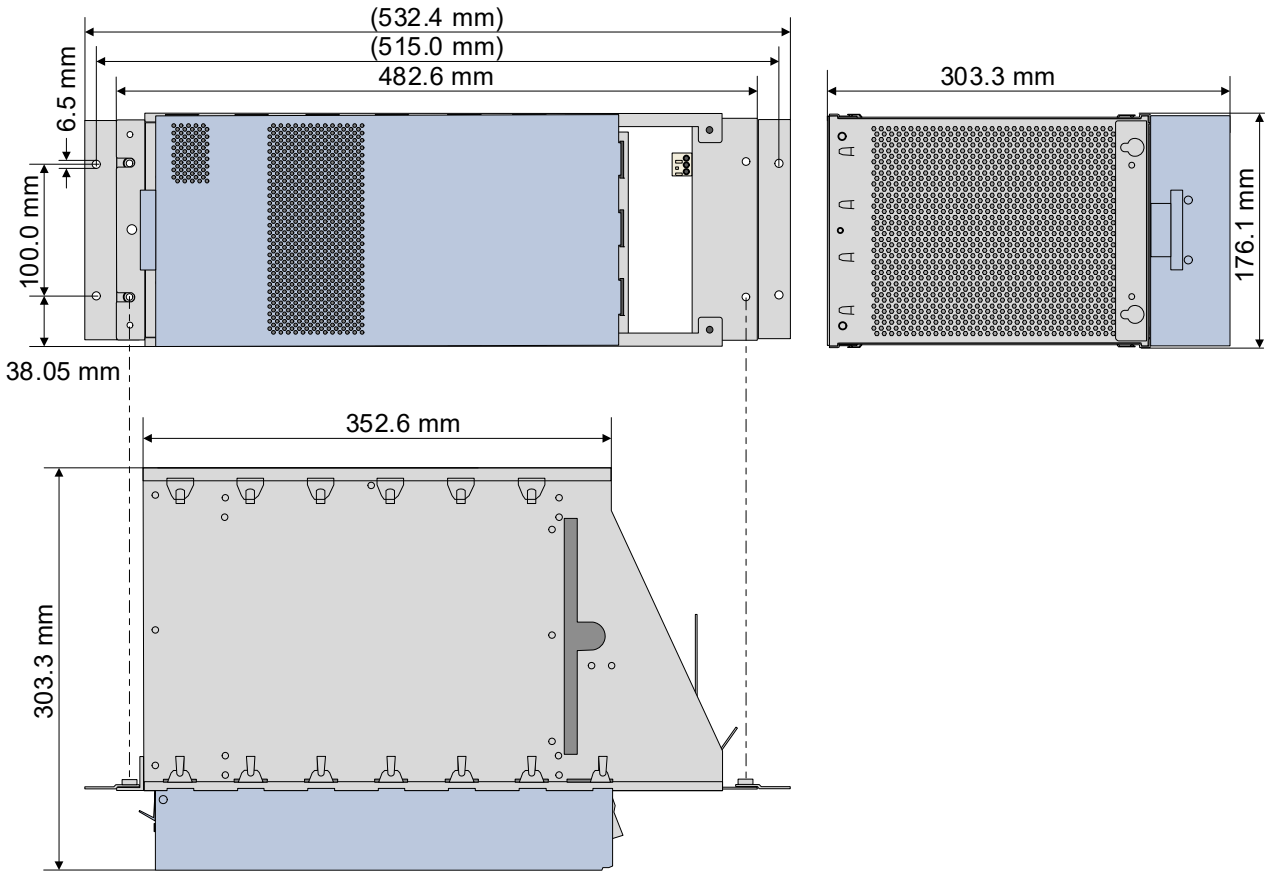


Figure 17: FOX612 subrack with ETSI adaptation

2.4.5 Wall Mounting

2.4.5.1 Overview

The wall mounting adapter allows you to install the FOX612 on a wall or in indoor/outdoor cabinets without 19-inch or ETSI mechanical infrastructure.

Wall mounting of the subrack requires the angle bracket to be installed in the rear position.

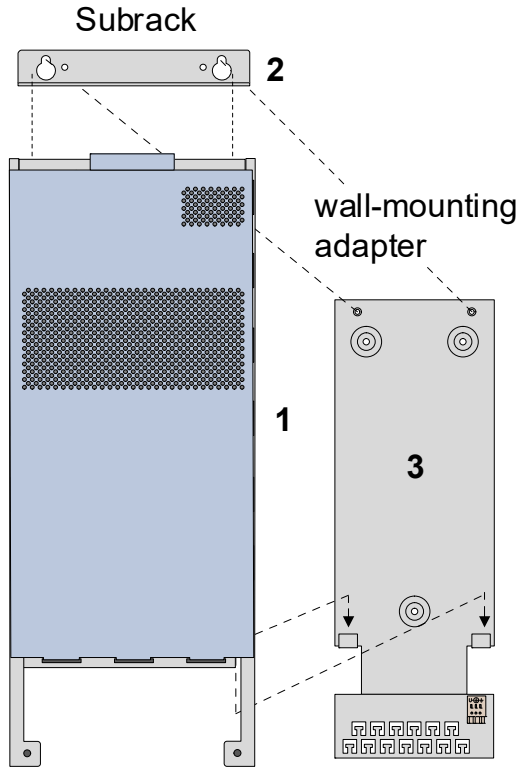


Figure 18: FOX612 and wall mounting

Legend to Figure 18:

1 Subrack

2 Angle bracket (rear) (fixed with 2 M4 screws to the FOX612subrack)

3 Wall mounting adapter

Please note:
The DUPF2 can not be equipped on the wall mounting adapter.

2.4.5.2 Subrack with Wall Mounting Adapter

The figure below shows the layout and the mechanical dimensions of the FOX612 subrack with the wall mounting adapter (top view not shown).

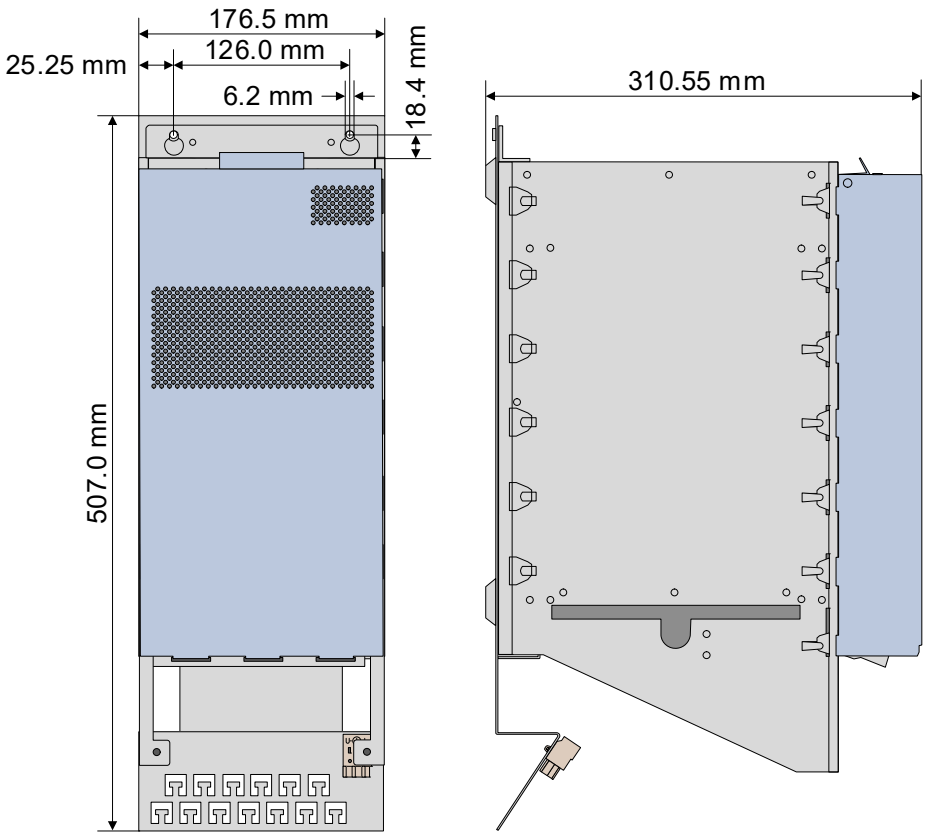


Figure 19: FOX612 subrack with wall mounting adapter

2.4.6 Torques

Torques as follows apply for the installation of 19-inch/ETSI equipment (subracks, adapters) and the screws of the unit front covers in the FOX612 subrack.

Table 2: Torques

Screw	Use/application	Torques [Nm]	
		Recommended	Maximum
M2.5	Unit front covers	0.45	0.56
M2.5	DUPF2	-	0.34
M4 (4.8)	FOX612 angle bracket	-	1.3
M4 (4.8)	Earthing / bonding terminal	-	2.0
M6 (4.8)	19-inch / ETSI equipment (subracks) and adapters	-	4.7

3 Installation Procedures

3.1 Unpacking and Equipment Check

3.1.1 Before You Start …

Before you start the installation of the FOX612, please check and complete the following preparatory steps.

- Layout of the equipment in the rack

  The proper layout of the FOX612 (and other) equipment in the rack is a prerequisite for all installation. This layout must consider
  - FOX612 subracks and cable trays
  - Power supply
  - Signal cabling
  - Other equipment

  The layout must indicate the exact position of each subrack and heat deflection devices in the rack considering its mechanical dimensions and the rules for the equipment installation.
- Rack
  - Rack is installed.
  - Metallic parts of the Rack are connected to the system ground.
- -48/-60 V_{DC} power supply
  - Power distribution is installed.
  - Positive rail is connected to the electrical system ground.
  - Negative supply rail features an individual circuit breaker protection for each subrack: Rating **16 A** (slow).
  - The power supply circuit(s) is (are) available on the FOX612 cable tray. The circuit(s) is (are) checked and fused (16 A slow) at the supply side. (terminal block “A”).
- Heat management
  - Fan unit (optional)
  - Alarm unit (optional)
  - The ambient temperature at the air entry of the subrack must never exceed the temperature range for system operation as specified in [1KHW002460] System Description “FOX-61x”.
- Check of material
  - FOX612 equipment and standard options
  - Cables

  Material checked and ready for installation.
- Subrack
  - The slot (number) in the subrack is defined for each unit.
  - Number of the slot and position of the cable with respect to the slot is documented for all units.
  - Units are not yet inserted (except for the FAMO2).
- Instructions for installation
  - Adhere to the general instructions as provided in the previous paragraphs.
  - Instructions for the installation for units (user manuals) are available.

3.1.2 Packaging of the Subrack and Accessories

The packaging of the equipment covers the various installation options of the FOX612 and includes the packaging of the corresponding adapters and equipment.

The packaging contains the equipment and material according to your order. Depending on the installation material and the optional items the sub-package A or B is used to pack these material (refer to Figure 20).

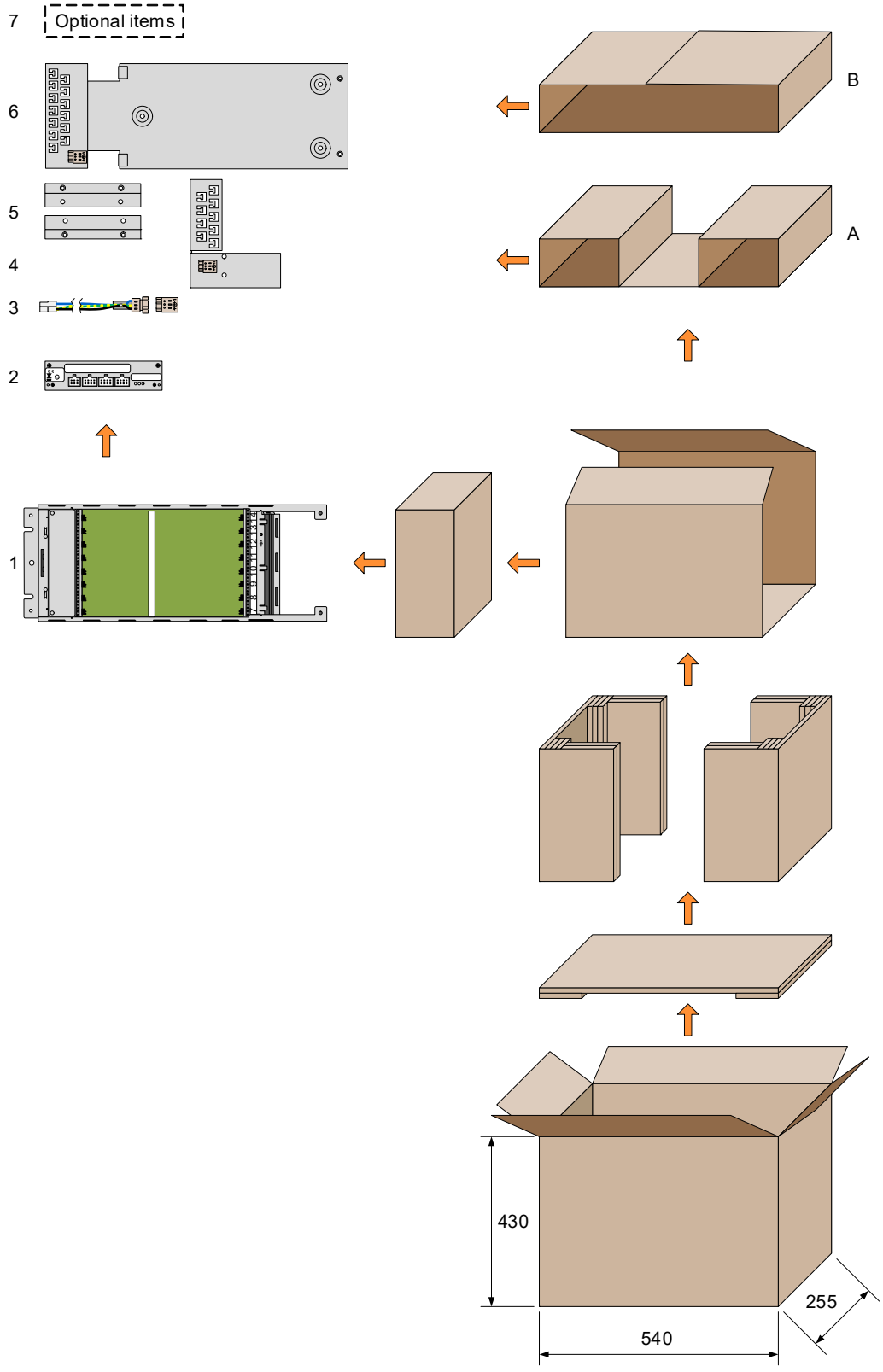


Figure 20: Packaging assembly of the FOX612

Legend to Figure 20:

1 Basic subrack including front cover (not shown).

2 FAMO2 fan unit or FAMO2-F alarm unit installed in the subrack or in separate package according to the ordered configuration.

3 48 V_{DC} power cable for removable subrack/adapter installation.

4 19-inch rack mounting set for the use with DUPF2.
5 ETSI adapter set: Optional, according to order.
6 Wall-mounting adapter: Optional, according to order.
7 Other optional items, delivery according to order.

Please note:
The packaging of the FOX612 does **not** contain the following installation material:
→ Captive nuts for the 19-inch rack installation option,
→ Screws for the 19-inch rack installation option.

Please note:
The FOX612 subrack may contain units depending on the ordered configuration. The FAMO2 fan unit or FAMO2-F alarm unit is normally also separately packed.

3.1.3 FOX612 Equipment

Check the unpacked equipment before you start the installation:

- Check for complete consignment and for correct designation (refer to ordering information, e.g. refer to [1KHW028777] Release Note “FOX61x”).
- Check the equipment for damages due to storage, transport or handling.
- Check the backplane connectors (subrack) for damaged pins.
- Check the front (if any) and backplane connectors of the units for damaged pins.
- Leave units in their protective ESD bags until you plug them into the subrack.

Please note:
Do not throw away any pieces packed with the equipment; you might use them later.

Please note:
There are no connectors packed with the basic unit. The connectors and cables are in separate packaging.

Please note:
Keep the original packaging of the components if you plan to move or dispatch the equipment later; the original packaging provides the best protection for the equipment.

3.1.4 Signal Cables

All external equipment connects via the connectors on the front panel of the units to the FOX612 (unit and traffic interfaces, maintenance interfaces, alarm and clock interfaces). Hitachi Energy provides signal cables of variable length for all traffic and system interfaces.

For the visual inspection of signal cables check the following:

- Mechanical condition of the connectors and the cables.
- The contact holes of the connector must be clean.
- Mechanical condition of the latching system of the units.
  Hitachi Energy provides cables with latching clips.
- The labeling (designation) of the cables must conform to the documentation of the installation.

Connector sets are provided for interfaces which are user configurable (alarm interfaces). The sets contain the Molex connector frame and crimp terminals.

3.2 Installation Step by Step

The steps to be followed for the complete installation of a FOX612 are as follows:

→ FOX612 installation. Proceed as follows:

1. Installation of the ETSI adapters (optional). Only required when the FOX612 is installed in an ETSI rack. Refer to section 3.3.1 Installing ETSI Adapters (Optional) (on page 31).
2. Installation of the 19-inch adapter/cable tray. Required when the FOX612 is installed in a 19-inch rack or an ETSI rack. Refer to section 3.3.2 Installing the 19-inch Adapter/Cable Tray (on page 32).
3. Installation of the wall mounting adapter (optional). Required when the FOX612 is not installed in a rack. Refer to section 3.3.3 Installing the Wall Mounting Adapter (on page 33).
4. Installation of the power supply cables. Refer to section 3.4.1 Installing the Power Supply Circuits (on page 34).
5. Installation of the dual power supply unit DUPF2 (optional). Refer to section 3.4.2 Installing the Dual Power Supply Unit DUPF2 (Option) (on page 38).
6. Installation of the signal cables. Refer to section 3.5 Signal Cables (on page 39).
7. Installation of the air filter (optional). Refer to section 3.6.1 Installing the Air Filter (Option) (on page 43).
8. Installation of the FOX612 subrack. Refer to section 3.6.2 Installing the FOX612 Subrack (on page 44).
9. Installation of the fan unit FAMO2 (optional) or alarm unit FAMO2-F (optional). Refer to section 3.7.1 Installing FAMO2 or FAMO2-F (on page 49).
10. Perform the final steps as tightening of screws, inserting traffic units or connecting signal cables. Refer to section 3.8 Final Steps (on page 55).

End of instruction

3.3 Rack and Wall Mounting

3.3.1 Installing ETSI Adapters (Optional)

The FOX612 equipment directly fits to 19-inch racks. To install the FOX612 in ETSI racks you must first install the appropriate ETSI adapters.

→ ETSI adapters installation. Proceed as follows:

1. Locate the position of the ETSI adapters in the ETSI rack.

   Please keep in mind, that the insertion/removal of the air filter requires a minimum space of 180 mm to neighboring equipment or walls on the filter insertion side.
2. If not already implemented, fit 2 captive nuts left and 2 captive nuts right for the two fixing holes with a distance of 100 mm.
3. Lift the left ETSI adapter into position and secure it using 2 M6 screws. Tighten the screws provisionally.
4. Lift the right ETSI adapter into position and secure it using 2 M6 screws. Tighten the screws provisionally.

End of instruction

Please note:
The left and the right ETSI adapters for the FOX612 are identical.
The required height of a horizontally mounted FOX612 subrack is 4 HU (177.8 mm).
The fixing holes to the ETSI rack have a distance of 100 mm.

Please note:
The ETSI adapter set contains
→ 4 captive nuts to fix the adapters (left and right) to the ETSI rack.
→ 4 screws to fix the adapters in the ETSI rack.
→ 4 screws to fix the FOX612 angle bracket and the 19-inch adapter/cable tray to the ETSI adapters.

3.3.2 Installing the 19-inch Adapter/Cable Tray

Please note:
The description below applies for horizontal equipment installation.

To install the FOX612 in 19-inch racks you must first install the 19-inch adapter/cable tray.

Captive nuts are required for the installation of the FOX612 equipment in 19-inch racks. In the 19-inch rack the nuts must be installed at positions as follows:

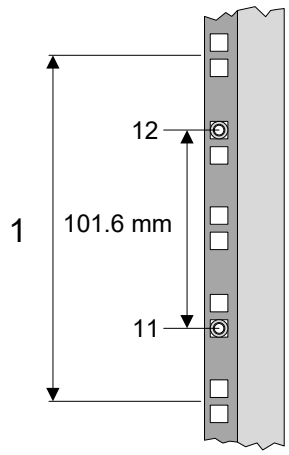


Figure 21: Position of the FOX612 19-inch adapter in the 19-inch rack

Legend:
1 19-inch adapter for the FOX612 with captive nuts at positions (11), (12)

→ 19-inch adapter/cable tray installation. Proceed as follows:

1. Locate the fixing position of the 19-inch adapter on the right rail of the 19-inch rack with the cable tray oriented inwards.
2. Fit 2 captive nuts at positions (11) and (12) for the two fixing holes with a distance of 101.6 mm.
   Please keep in mind that the insertion/removal of the air filter requires a minimum space of 180 mm to neighboring equipment or walls on the filter insertion side.
3. Lift the adapter into position and secure it with 2 M6 screws. Tighten the screws provisionally.

End of instruction

Please note:
The required height of a horizontally mounted FOX612 subrack is 4 HU (177.8 mm).

The fixing holes to the 19-inch rack have a distance of 101.6 mm.

Please note:
The packaging of the FOX612 does **not** contain any captive nuts or screws.

Please note:
The packaging of the 19-inch adapter/cable tray contains

→ 2 screws to fix the FOX612 subrack to the adapter.

3.3.3 Installing the Wall Mounting Adapter

To install the FOX612 equipment on walls you must first install the wall-mounting adapter.

→ Wall mounting adapter installation. Proceed as follows:

1. The wall-mounting adapter is fixed by means of 3 screws on the wall. You can use the adapter as a drilling template if required.
   Depending on the nature of the wall, you select the appropriate type of screws and method to anchor the screws. It is also possible to screw the adapter on C-shaped rails. The adapter accepts
   - screws with diameters up to 6 mm,
   - washers and screw heads with a diameter of up to 22 mm (washer and screw head with an accumulated height of not more than 6 mm).
2. Position the wall-mounting adapter.
   Leave sufficient space between the upper edge of the adapter and the equipment or panel above to allow the air to evacuate easily from the subrack (recommended 2 HU = 88.9 mm).
   Please keep in mind, that the insertion/removal of the air filter requires a minimum space of 180 mm to neighboring equipment or walls on the filter insertion side.
3. Prepare the wall according to the selected method for the 3 screws.
4. Secure the wall-mounting adapter with the 3 screws and tighten the screws.

End of instruction

NOTICE **Attention to temperature range. Risk of equipment damage!**
Insufficient distances between the equipment and its surroundings may lead to insufficient air flow and may cause damage to the equipment.

→ Leave sufficient space between the upper edge of the adapter and the equipment or panel above to allow the air to evacuate easily from the subrack (recommended 2 HU = 88.9 mm).

3.3.4 Installation in Cabinets

To install the FOX612 equipment in cabinets without a mechanical rack infrastructure you must first install the wall-mounting adapter.

The methods and procedures for the installation are principally the same as for the installation on walls. Some of the cabinets provide special mounting plates at their rear.

Please note:

The cable inlet for the cabinet requires special attention, especially with outdoor cabinets.

Do not forget the appropriate lightning protection.

Hitachi Energy does not provide indoor or outdoor cabinets tailored to the FOX612.

3.4 Powering

3.4.1 Installing the Power Supply Circuits

WARNING **Hazardous electric currents. Risk of flashover and electric shock!**

Connecting the power leads while the power is switched on may cause a flashover or an electric shock. This may lead to serious injury.

→ Make sure that the -48/60 V_{DC} power is switched off before you connect the power leads to the plug socket.

WARNING **Hazardous electric currents. Risk of flashover and electric shock!**

Using power cables with defective or insufficient insulation causes danger to your health and can result in serious injury through short circuits or flash-over.

→ Make sure that power cables insulation is in good order (e.g. near the WAGO plug socket) before using these cables, and before taking the equipment into operation.

With a single power supply the wiring for the supply voltage U1 has to be installed and terminated in the WAGO plug socket delivered with the FOX612 power cable.

With the optional dual power supply the wiring for the two supply voltages U1 and U2 has to be installed and terminated in the WAGO plug sockets delivered with the DUPF2 unit.

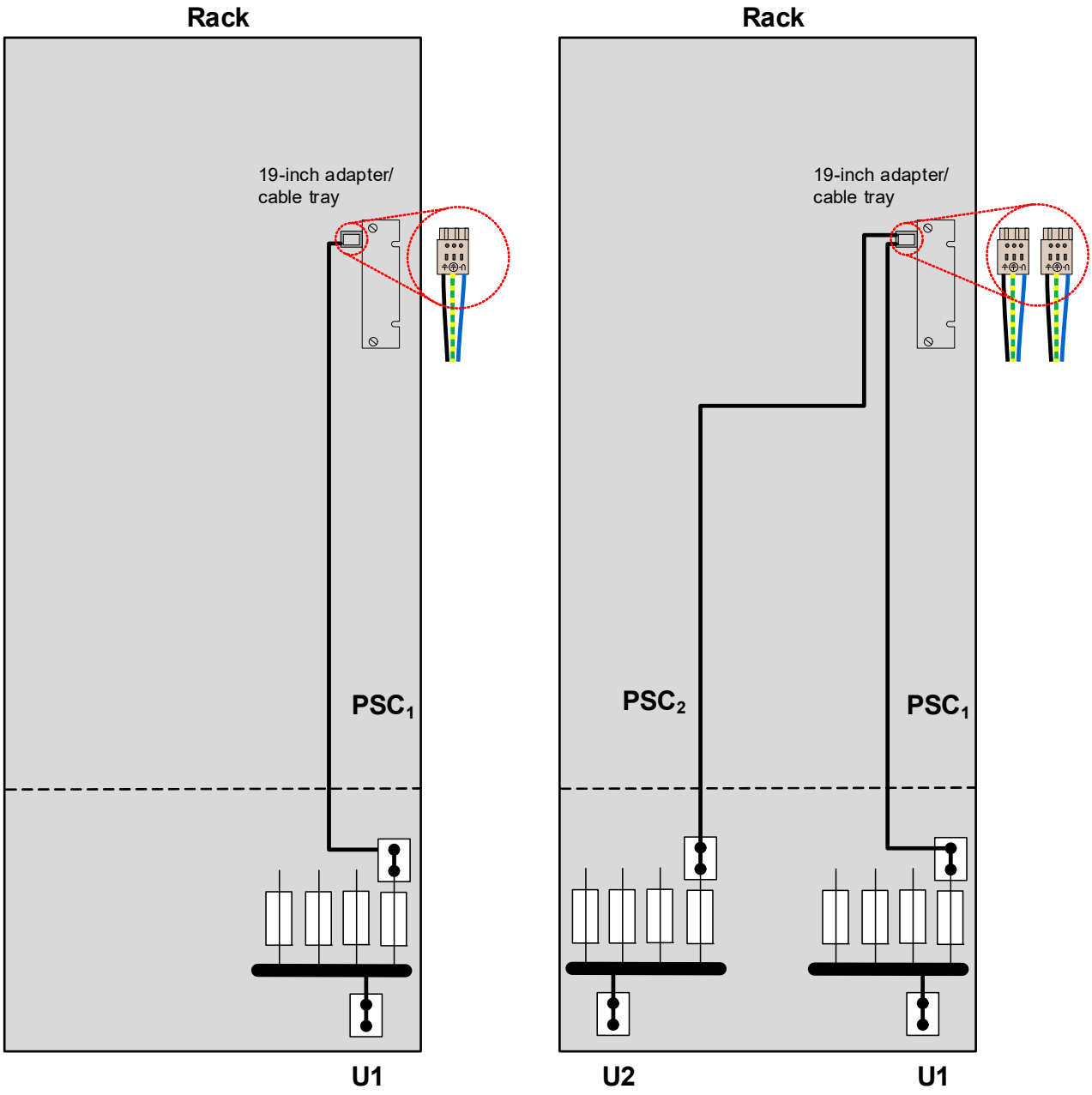


Figure 22: Single and dual power supply circuits

3.4.1.1 Single Power Supply

Single power supply is available for installations with the 19-inch adapter/cable tray and with the wall mounting adapter/cable tray.

The following instructions prepare the power supply wiring for the connection of the power supply to the FOX612 subrack.

→ Power supply cable installation. Proceed as follows:

1. Take the original power cable provided with the FOX612 and remove the WAGO plug socket.

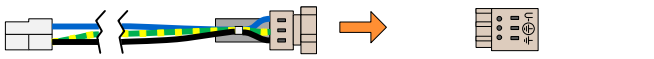
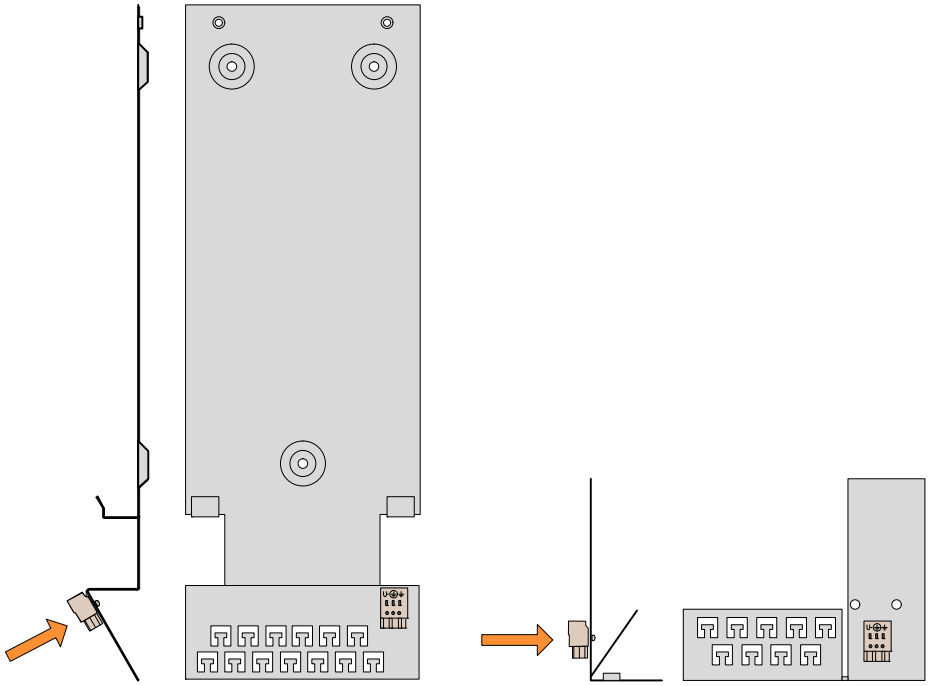


Figure 23: WAGO plug socket

2. Snap the studs of the WAGO plug socket into the 3 holes from inside the cable tray (arrow), with the plug socket oriented as shown in the figure below:



Wall mounting adapater/cable tray

19-inch adapater/cable tray

Figure 24: Adapter/cable tray with installed WAGO plug socket

3. Connect the cables providing the power supply and system ground on the WAGO plug socket. The block has a cage spring wire grip.
   - Strip the insulation to a maximum of 8 mm to 9 mm (a).
   - Open the grip by pushing down with a screwdriver (b). Use a small screwdriver to release the holding springs while inserting the wires.
   - Push the stripped wire in (c).
   - Release the grip (d).

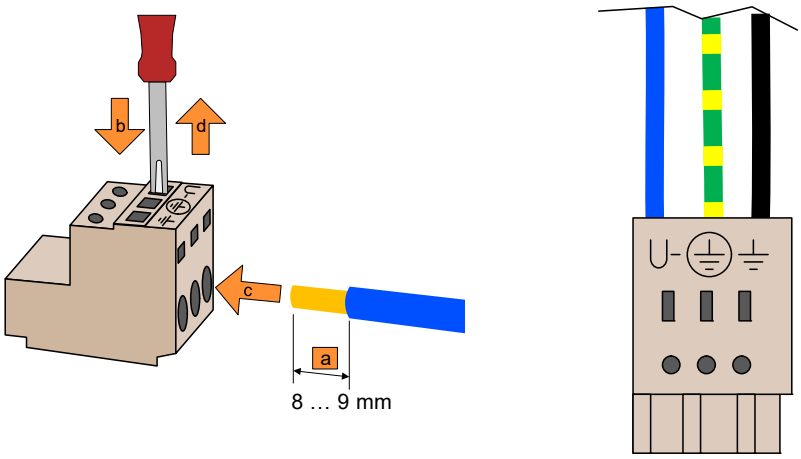


Figure 25: Wiring of the WAGO plug socket

Legend to the symbols of the plug socket:

⏚ 0 volt conductor for power, black conductor

System ground of the subrack, green/yellow conductor

U-

- 48/60 V_{DC} for power supply, blue conductor

4. Check the connections for firm fit and unprotected single wires.

End of instruction

3.4.1.2 Dual Power Supply

Dual power supply is available only for installations with the 19-inch adapter/cable tray. Dual power supply requires the DUPF2 unit to be installed in the 19-inch adapter/cable tray. Refer to section 3.4.2 Installing the Dual Power Supply Unit DUPF2 (Option) (on page 38).

The following instructions prepare the power supply wiring for the connection of the dual power supply to the FOX612 subrack.

→ Power supply cable installation. Proceed as follows:

1. Take the DUPF2 unit delivered as an optional item and remove the two WAGO plug sockets.

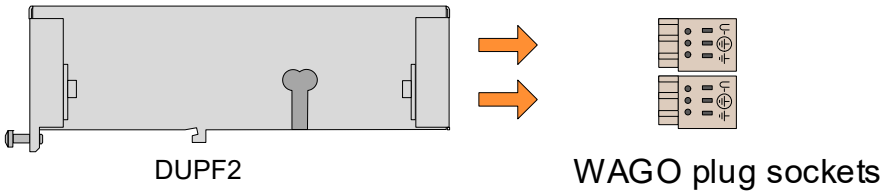


Figure 26: WAGO plug socket

2. Connect the cables providing the power supply and system ground on the WAGO plug socket. The block has a cage spring wire grip.
   - Strip the insulation to a maximum of 8 mm to 9 mm (a).
   - Open the grip by pushing down with a screwdriver (b). Use a small screwdriver to release the holding springs while inserting the wires.
   - Push the stripped wire in (c).
   - Release the grip (d).

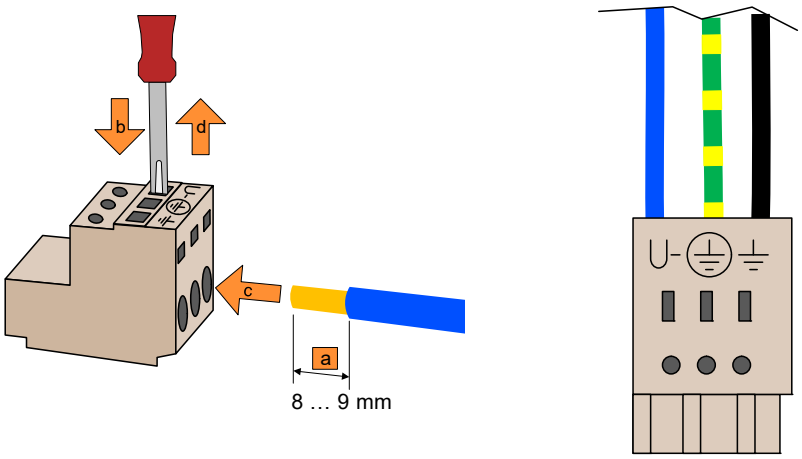


Figure 27: Wiring of the WAGO plug socket

Legend to the symbols of the plug socket:

0 volt conductor for power, black conductor

⏚ System ground of the subrack, green/yellow conductor

U- - 48/60 V_{DC} for power supply, blue conductor

3. Check the connections for firm fit and unprotected single wires.

End of instruction

---

i **Please note:**
The DUPF2 does not contain fuses for the supply voltages U1 and U2.
→ These have to be provided externally.

i **Please note:**
The WAGO plug sockets will be plugged to the DUPF2 unit **after** the installation of the DUPF2 unit.

3.4.2 Installing the Dual Power Supply Unit DUPF2 (Option)

The DUPF2 unit is mounted on an extrusion of the 19-inch adapter/cable tray.

→ DUPF2 installation. Proceed as follows:

1. Insert the two hooks of the DUPF2 unit into the holes provided on the 19-inch adapter/cable tray.

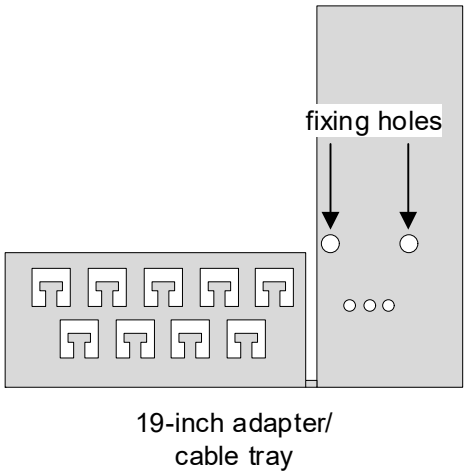


Figure 28: Fixing holes on the 19-inch adapter/cable tray

2. Tighten the screw on the front panel of the DUPF2 unit to pull the DUPF2 forward and lock it into place.

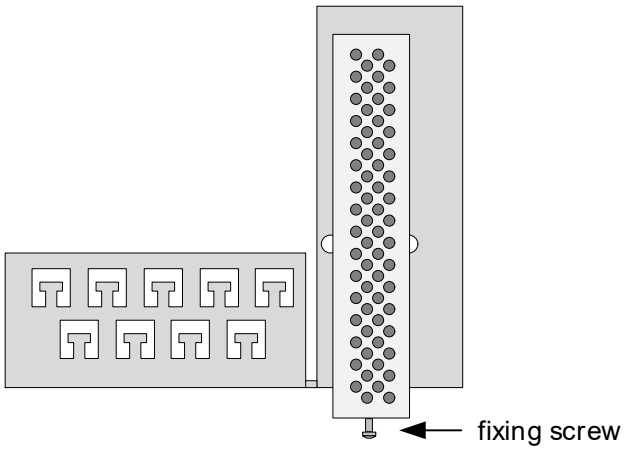


Figure 29: Fixing screw on the DUPF2 unit

3. Plug the two WAGO plug sockets to the connectors labeled “U1” and “U2” at the rear of DUPF2.

   Make sure the two power supply cables are identifiable (labels) and can be referenced to the alarms.

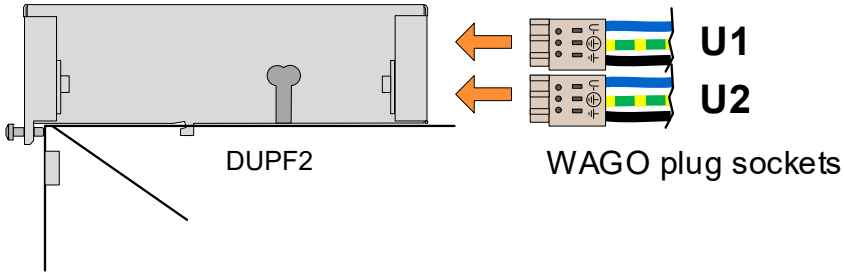


Figure 30: Power supply circuits connected to DUPF2

End of instruction

3.5 Signal Cables

3.5.1 Tying Signal Cables to the Cable Tray

The adapter/cable tray makes the installation of the external cabling for the units easier. It provides a means to arrange and fix the cables before the installation of the subrack and thus provides space for convenient working.

The adapter/cable tray provides 2 rows of fastening bows that allow you to fix the signal cables by means of cable ties. It is essential that you

- position the signal cables on the fastening bows with respect to the position of the corresponding unit in the subrack (order of cables).
- align the connectors for each unit and interface with respect to the front line of the adapter/cable tray.

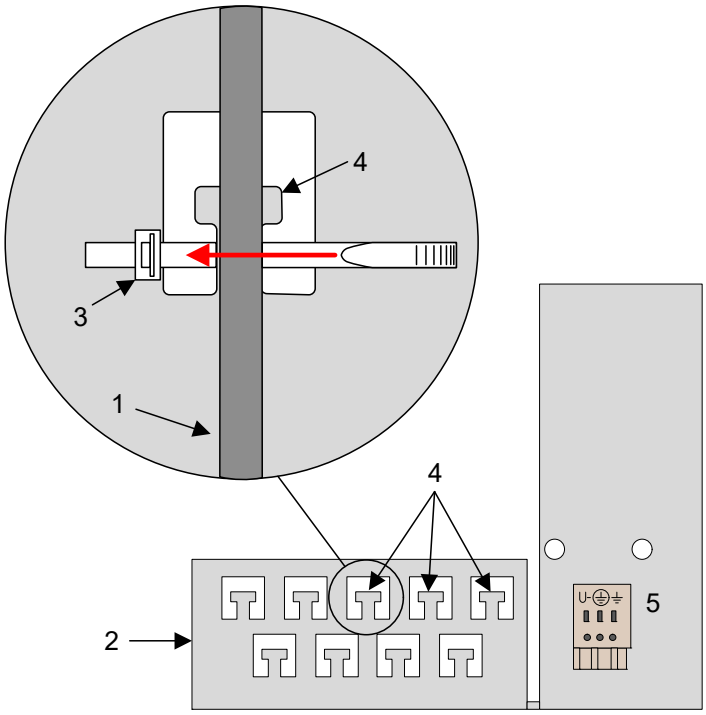


Figure 31: Fixing signal cables on the adapter/cable trays

Legend to Figure 31:

1 Cable
2 Base of the 19-inch/wall mounting adapter/cable tray
3 Cable tie (fixing the cable to the base of the cable tray)
4 Fastening bow
5 WAGO plug socket

The (signal) cables have a common metallic braid shield for all the signal leads of the cable and a

- one-ferrite EMC filter (refer to Figure 32),
- two-ferrites EMC filter (refer to Figure 33).

Please note:
To maintain the equipment's EMC status signal cables without braid shield are no longer supported!

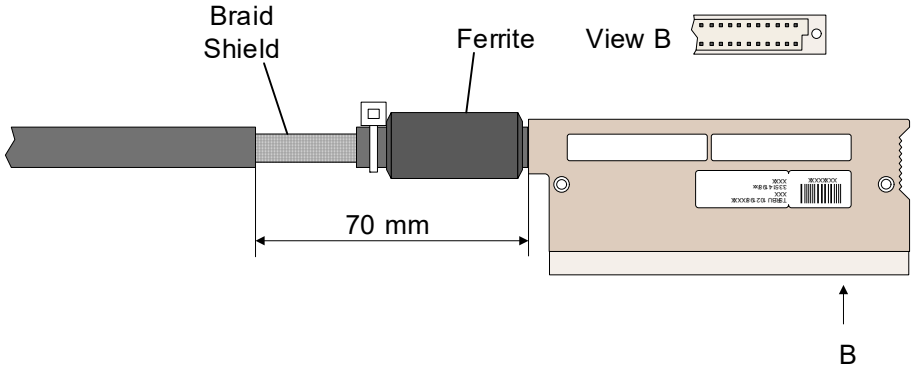


Figure 32: Cable with a one-ferrite EMC filter (sample)

The interface cables for interfaces such as

- multiple interface cables in one connector

- clock interfaces
- etc.

are implemented according to this scheme.

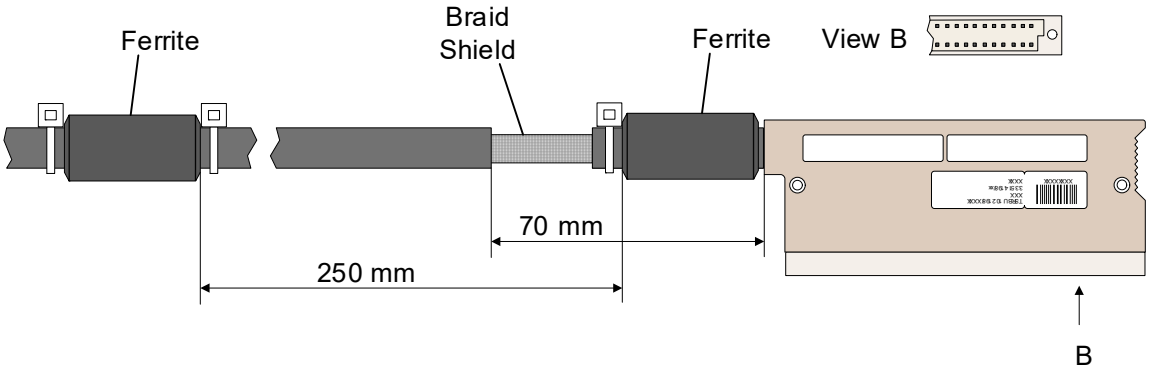


Figure 33: Cable with a two-ferrites EMC filter (sample)

Figure 34 and Figure 35 show samples of alignment for the cable with an EMC filter (with two-ferrites) for the 19-inch and wall-mounting options.

Please note:
The figures below do not show cable connector locks.

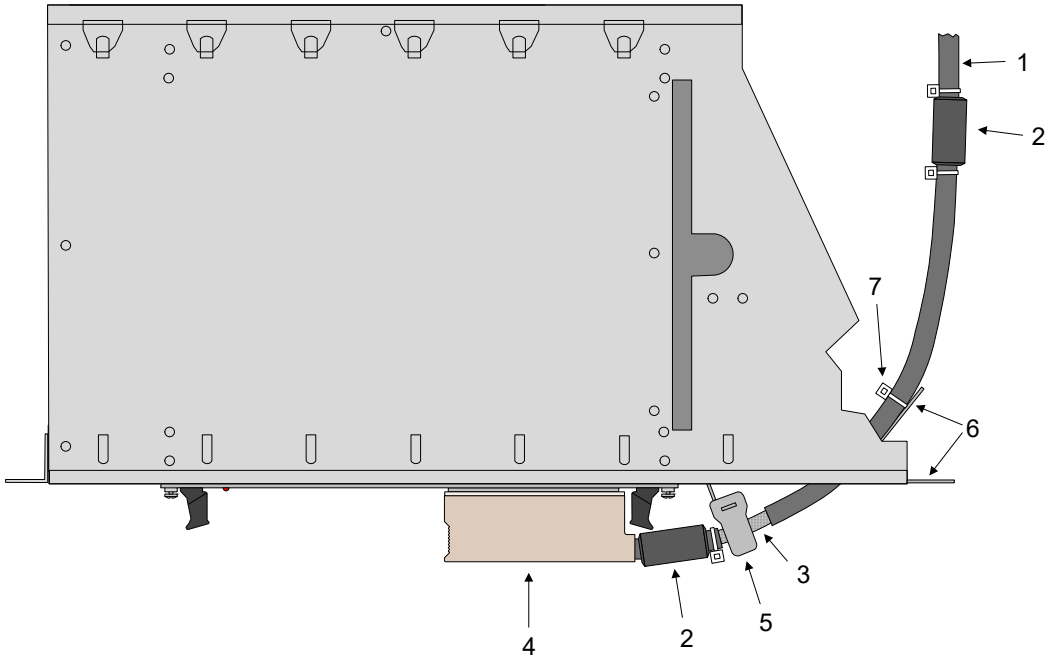


Figure 34: FOX612 and cable installation with EMC-filter in 19-inch and ETSI racks

Legend to Figure 34:

1 Cable
2 Ferrite(s)
3 Exposed section of cable screen
4 DIN connector to FOX612 unit
5 Earthing bar with cable clamp
6 Base of cable tray/19-inch adapter
7 Cable ties (fixing the cable to the base of the cable tray)

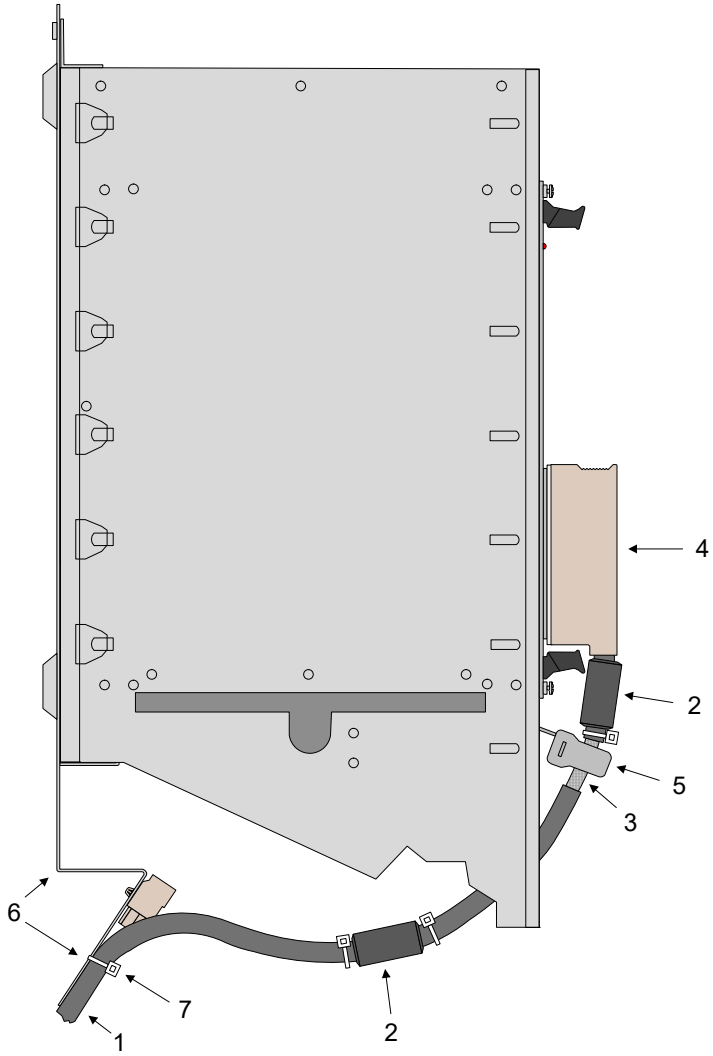


Figure 35: FOX612 and cable installation with EMC-filter on wall-mounting adapter

Legend to Figure 35:

1 Cable
2 Ferrite(s)
3 Exposed section of cable screen
4 DIN connector to FOX612 unit
5 Earthing bar with cable clamp
6 Base of cable tray/wall mounting adapter
7 Cable ties (fixing the cable to the base of the cable tray)

The distance between the cable tray and the connector as well as the type of the cable and connector depends on the plug-in unit (although identical for most units and interfaces). The distance of the area with exposed cable shield is constant with respect to the front line of the cable tray.

Please note:
The figures above do not show cable connector locks!

To install the cables onto the cable tray you need to follow specific steps.

→ Installation of cables to the adapter/cable tray. Proceed as follows:

1. Label the cables with their respective slot number (as previously documented).

2. Align each cable on the adapter/cable tray with its slot number.
3. Align the connectors with the front line of the adapter/cable tray as indicated in the installation instructions for the corresponding unit (refer to the figures above). The cable length between connector and cable tray depends on the unit and interface.
4. Place the cable ties in order to allow cables to be bent neatly from the adapter/cable tray to the subracks earthing bar.
5. Secure each cable loosely (e.g. with the cable ties). It should still be possible to move cables back and forwards. The signal cables have to be arranged (and fixed) on the adapter/cable tray so as not to block the access to adjacent units in the subrack.

End of instruction

NOTICE **Attention to temperature range. Risk of equipment damage!**
Cables could block the airflow into the subrack and cause damage to the equipment through overheating.
→ Cables should be positioned so as not to block the airflow into the subrack.

3.5.2 Tying Cables to their Connection Points

The cables terminated on the FOX612 are connected to their connection points in accordance with the documentation of the installation and the local requirements.

STOP **Risk of operating trouble!**
Attention to EMC properties!
it is essential to maintain the EMC characteristics of the FOX612 system.
→ Connect the shield of the cables at both sides, at the FOX612 earthing bar and at the external earthing / bonding point (e.g. distribution frame).

Lightning protection is implemented at the connection points of the cables to the outside world. The FOX612 equipment only provides secondary protection.

The description of lightning and over-voltage protection is beyond the scope of this installation guide. For more information on the implementation of lightning and over-voltage protection, refer to [1KHW002463] Installation Instruction “Lightning Protection”.

3.6 Subrack

3.6.1 Installing the Air Filter (Option)

The FOX612 subrack provides a slot below the units to filter the air that the FAMO2 transports through the subrack. This option is mainly used for wall installations.

The subrack design allows you to install the filter from the left (top) or right (bottom) side of the subrack. Inserting and removing the filter requires some free space to this side (refer to the Figure 36).

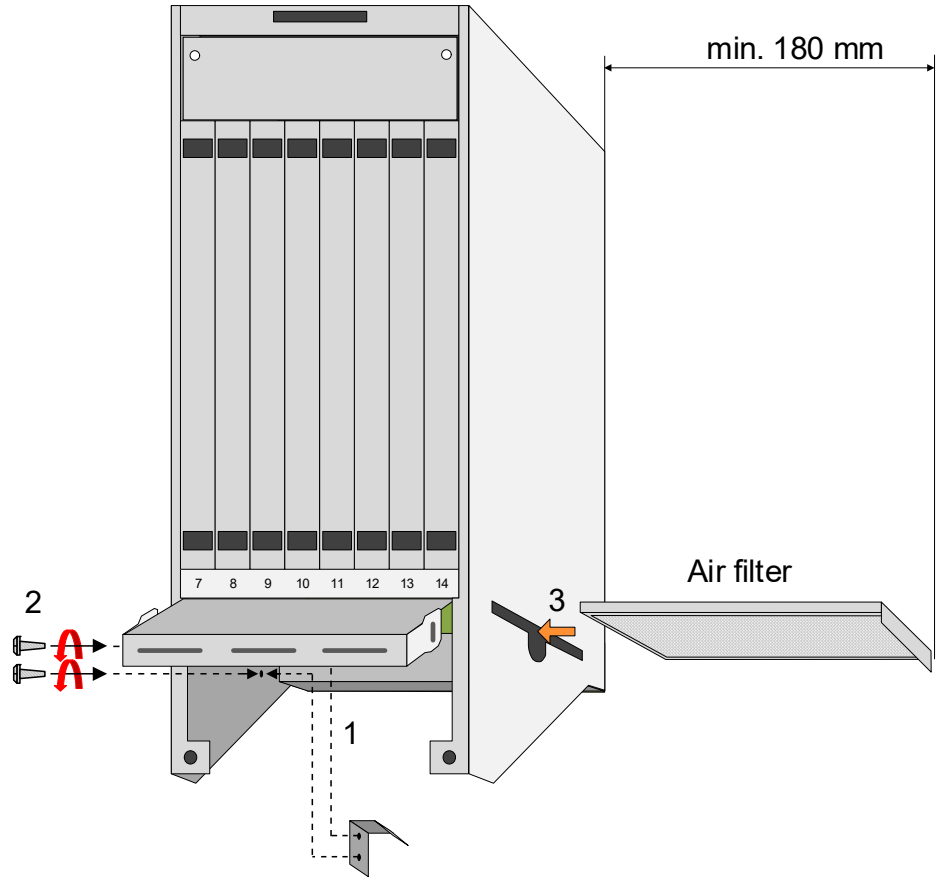


Figure 36: Installation of the air filter

→ Installation of the air filter. Proceed as follows:

1. Select the side opposite of the side from where you want to insert the air filter.
2. Move the filter guide bar (orientation as shown in the figure above, left side shown) into the FOX612 subrack (1) until the 2 holes in the guide bar fit the corresponding holes of the subrack.
3. Secure the guide bar from the outside with the 2 self-threading screws (2) to the FOX612 subrack.
4. Turn the air filter with the overlaying flange (= handle) away from the FOX612 subrack. The open side of the filter frame and handle must show outwards of the subrack (the metal grid of the filter frame must face the card cage of the subrack).
5. Insert the air filter into the FOX612 subrack (3) until it locks between the FOX612 card cage and the filter guide bar.

End of instruction

3.6.2 Installing the FOX612 Subrack

3.6.2.1 Prerequisites

Before you mount the subrack, please make sure that the installation of the

- power supply on the cable tray,
- signal cables,

is complete and checked.

Please note:
If you want to implement the air filter option with the FAMO2, you should install the filter before the installation of the subrack.

NOTICE **Attention to temperature range. Risk of equipment damage!**
High ambient temperature may cause damage to equipment.
→ It is essential to maintain the specified range of the ambient temperature for the subrack in order to preserve the system specifications and prevent the system from overheating.

NOTICE **Attention to temperature range. Risk of equipment damage!**
If you stack equipment with the FOX612 in the vertical position, hot air is transported towards the equipment above and might cause a high temperature environment for that equipment.
→ You must install a heat deflection shield on top of the equipment below to evacuate the heat produced there. Depending on the rack, the top equipment does not require heat deflection.

3.6.2.2 Subrack Earthing

For reliable EMC results of the FOX612 installation it is required that the FOX612 subrack is connected to the protective ground.

WARNING **Attention to proper earthing. Risk of electric shock!**
It is mandatory to connect the FOX612 subrack to a suitable protective ground e.g. the Common Bonding Network!

There are two methods how to provide the earthing for the FOX612 subrack:

- The subrack is connected to the protective ground directly via the rack:
  The 19-inch mounting flanges of the subrack are conductive and provide a contact to the rack if the rails of the rack also provide a conductive surface. The rack must be connected to the protective ground.
  This is the preferred method, providing a simple and reliable system earthing.
- As an alternative the subrack is connected to the protective ground via an earthing cable (refer to Figure 37):
  The earthing wire must
  - have a cross section of 10 mm^2,
  - be equipped with a crimp lug (10 mm^2 wire cross section, M4 screws) on the FOX612 subrack side,
  - provide an excess length of 40 – 50 cm outside the installation plane of the rack at the right (upper) side of the rack.
  - be reliably connected to the Common Bonding Network (For details of the Common Bonding Network principles, refer to ETSI EN 300 253).
    The rack normally provides a suitable terminal of the CBN.

  The subrack provides an earthing / bonding terminal for reliable system earthing.
  Due to limited accessibility of the terminal after the installation of the subrack it is recommended that the earthing / bonding connection is implemented on the subrack when the FOX612 subrack is installed in the rack.

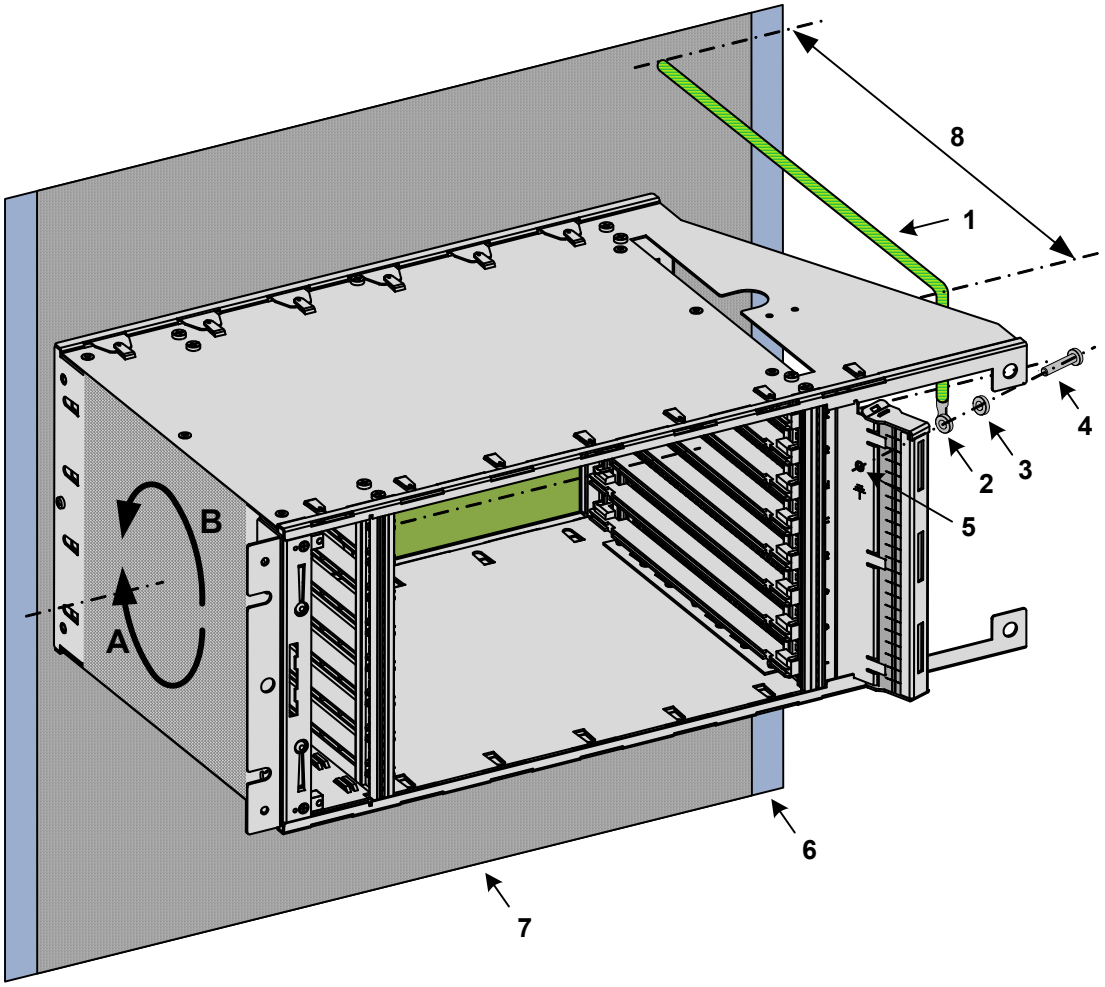


Figure 37: Earthing / bonding point of the FOX612 subrack

Legend:

1 Earthing cable
2 Crimp lug
3 Washer
4 Flat head screw M4 x 8 mm (min.)
5 Earthing / bonding terminal (M4 thread)
6 Right mounting rail of the rack
7 Front installation plane of the rack
8 40 – 50 cm excess length

The steps to connect the earthing / bonding point of the FOX612 subrack to the local Common Bonding Network are as follows:

→ Earthing / bonding point connection. Proceed as follows:

1. Turn (A) the FOX612 subrack upside down around its longitudinal axis (Figure 37 shows the terminal in its normal position).
2. Lift the subrack to the rack in such a way that the crimp lug (2) of the earthing cable (1) reaches easily the earthing / bonding terminal (5) (bottom side!)
3. Fix the crimp lug (2) of the earthing cable (1) with the screw (4) (don't forget the washer (3)) on the earthing / bonding terminal (5).
4. Arrange the earthing cable (1) in such a way that it leaves to the right.
5. Tighten the screw (4) firmly.

6. Turn (B) the FOX612 subrack with the earthing cable (1) connected back in its normal position (Figure 37).

End of instruction

Risk of operating trouble!
It is essential to keep the **resistance** of the earthing connection between the subrack and the protective ground **very low** (recommended value according to IEC 62368-1: < 0.1 Ohm).

3.6.2.3 Power Cable

The backplane at the rear of the subrack provides a 3-pin (fast-on) terminal for the power supply and the system ground.

Subracks commissioned for DC powering are delivered with a power cable, one end terminated with a connector fitting this terminal, the other end terminated with a WAGO connector.

Fast-On connector (subrack side)

WAGO connector (cable tray side)

Figure 38: Power cable for the subrack

The matching WAGO plug socket on the adapter/cable tray or on the DUPF2 unit terminates the external cables providing the power supply and system ground.

At the time of delivery, the matching WAGO plug socket is plugged onto the WAGO connector of the power cable. This plug socket is used for the 19-inch and wall-mounting adapter/cable trays with single power supply. With dual power supply the matching WAGO plug socket is implemented on the DUPF2 unit.

Please note:
If required, you can directly terminate a customized power supply cable (without intermediate WAGO connector) on the plug fitting to the 3-pin (fast-on) terminal. However, with this type of connection you will lose the flexibility of the front access for the connection of the power supply.

3.6.2.4 Rack Installation

To install the subrack on the ETSI/19-inch adapter/cable tray, you need to follow specific steps (for the numbers in brackets refer to Figure 39).

→ Subrack installation in a rack. Proceed as follows:

1. Plug the 3-pin connector of the power cable (1) to the fast-on contacts at the rear of the subrack.
2. For 19-inch racks only:

   Locate the top fixing position of the subrack and fit two captive nuts for the subrack opposite to the 19-inch adapter/cable tray.
3. Lift the subrack into position and secure the subrack with M6 screws. Tighten the screws loosely.
4. Align the subrack and adapter(s) with respect to the rack. Now tighten all the screws.
5. Ensure that the power cable coming from the rear of the rack remains accessible from the front.

6. Connect the power cable WAGO connector (2) to the WAGO plug socket (3) on the 19-inch adapter/cable tray (single power supply) **or** connect the power cable WAGO connector (2) to the WAGO plug socket labeled UT on the DUPF2 unit (dual power supply).

   This step is left out if the power supply cable is directly connected to the fast-on contacts on the subrack.
7. Align the power cable.

End of instruction

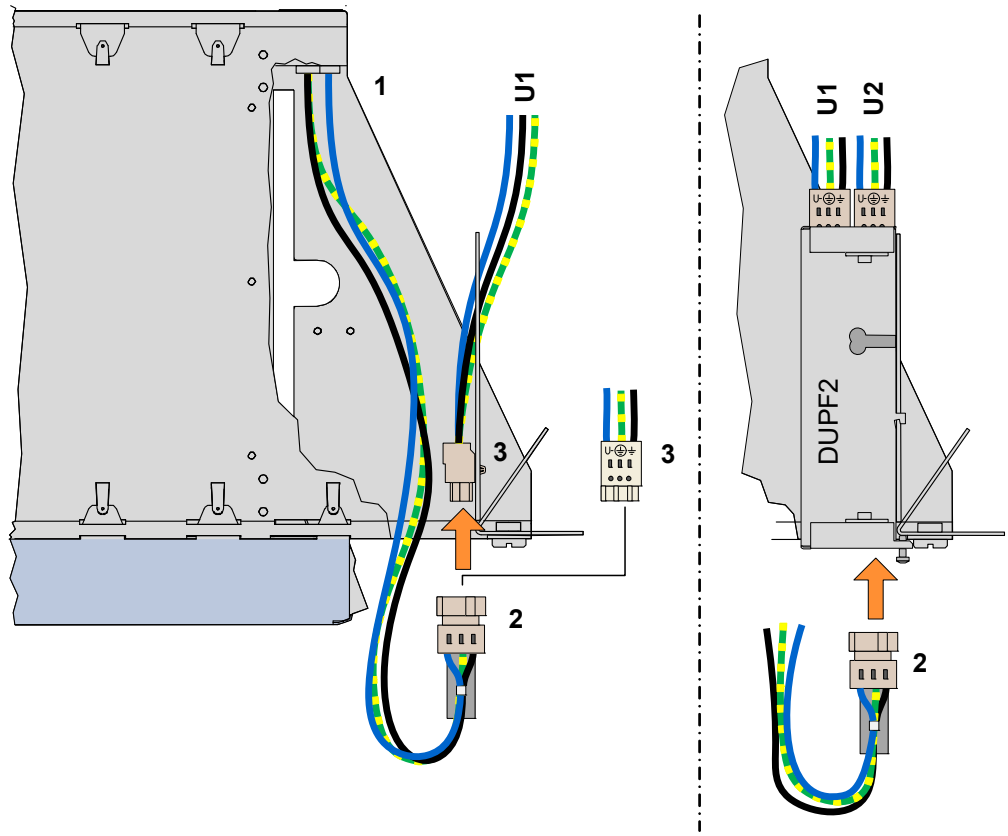


Figure 39: Connecting the power cable to the subrack, single and dual power supply

Please note:
In the figure above the power cable connector (2) for the single power supply is drawn from upside and not in the appropriate position for connecting the cable.

3.6.2.5 Wall Mounting Installation

To install the subrack on the wall-mounting adapter/cable tray, you need to follow specific steps (for the numbers in brackets refer to the Figure 40).

→ Subrack installation to a wall. Proceed as follows:

1. Plug the 3-pin connector of the power cable (1) to the fast-on contacts at the rear of the subrack.
2. Loosely screw 2 M5 screws into the nuts at the top of the wall-mounting adapter.
3. Lift the bottom rear of the subrack into the 2 brackets above the cable tray of the wall-mounting adapter.
4. Slide the subrack on the adapter some millimeters upwards until the 2 screws at the top penetrate through the key hole shaped holes in the angle bracket at the rear top of the subrack.

5. Carefully lower the subrack until it fits the two bottom brackets again and the 2 top screws are fully inside the slim part of the key hole shaped holes.

   Tighten the screws loosely.
6. Align the subrack with the wall-mounting adapter. Now tighten the 2 screws at the top of the subrack.
7. Ensure that the power cable coming from the rear of the rack remains accessible from the front.
8. Connect the power cable connector (2) to the WAGO plug socket (3).

   This step is left out if the power supply cable is directly connected to the fast-on contacts on the subrack.
9. Align the power cable.

End of instruction

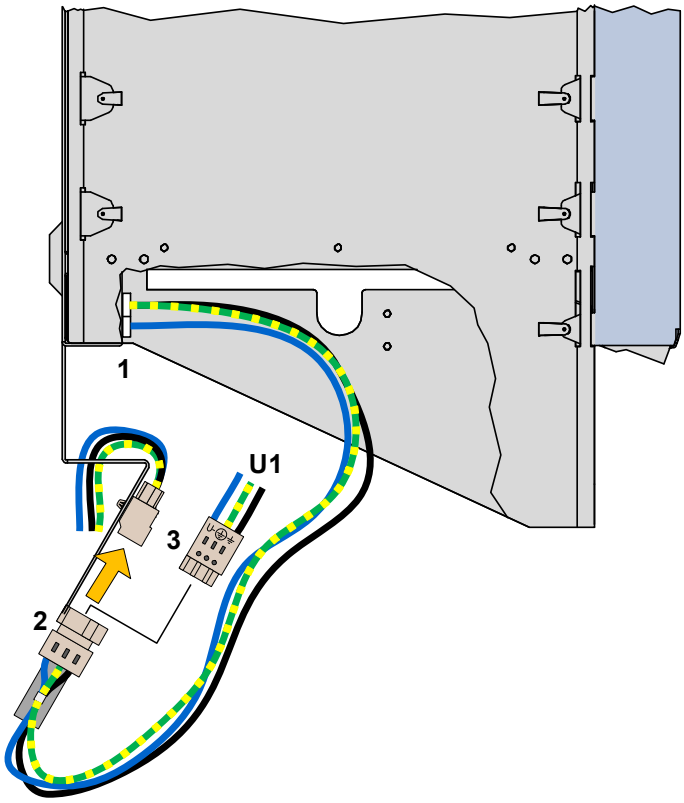


Figure 40: Connecting the power cable to the subrack

Please note:
In the figure above the power cable connector (2) is drawn from upside and not in the appropriate position for connecting the cable.

3.7 Fan Unit or Alarm Unit (Option)

3.7.1 Installing FAMO2 or FAMO2-F

The FAMO2 unit or FAMO2-F unit is integrated in the FOX612 subrack. This means that you do not need to connect cables or other external equipment.

Risk of operating trouble!
Operating the FOX612 without a fan unit requires a vertical installation of the subrack.
→ Otherwise the air flow will not be sufficient to cool the equipment.

Please note:
If you want to implement the air filter option with the FAMO2, you should install the filter before the installation of the subrack.

To implement the FAMO2 or FAMO2-F unit (if not already installed) proceed as shown in the figure below:

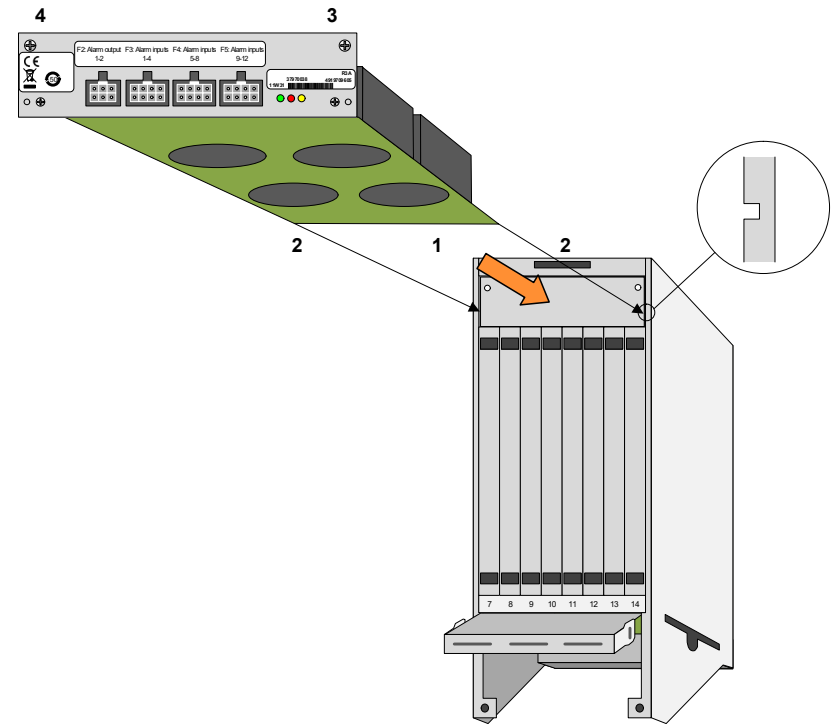


Figure 41: Installation of the FAMO2 or FAMO2-F unit

→ Installation of the FAMO2 fan unit or FAMO2-F alarm unit. Proceed as follows:

1. Insert the FAMO2 (1) (fans at the upper side) or FAMO2-F into the slot on top the FOX612 subrack.
   To this end, insert the edges (2) of the FAMO2 or FAMO2-F bottom plate into the notches at the left and right side of the slot. Insert the unit completely. Do not use force to plug the unit connector into the connector terminal on the backplane.
2. Secure the FAMO2 or FAMO2-F unit with the 2 screws (3) and (4).

End of instruction

The installation of the FAMO2 or FAMO2-F requires no additional steps. All electrical contacts are implemented via the internal backplane interface.

3.7.2 Alarm Interfaces

3.7.2.1 Interfaces and Connectors

The FOX612 alarm interfaces are physically all implemented on the FAMO2 or FAMO2-F unit. The individual input and output interfaces are arranged in groups with a connector per group.

Please note:
The FAMO2 (R2) does not provide the alarm output interfaces, i.e. has no connector F2.

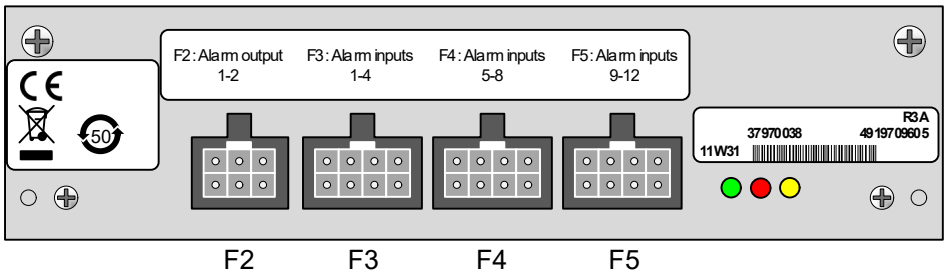


Figure 42: FAMO2 and FAMO2-F alarm interfaces

All alarm interfaces use Molex connectors.

For all connections between FOX612 equipment cables are provided. Connector sets are provided for interfaces which are user configurable (alarm interfaces). The sets contain the Molex connector frame and crimp terminals.

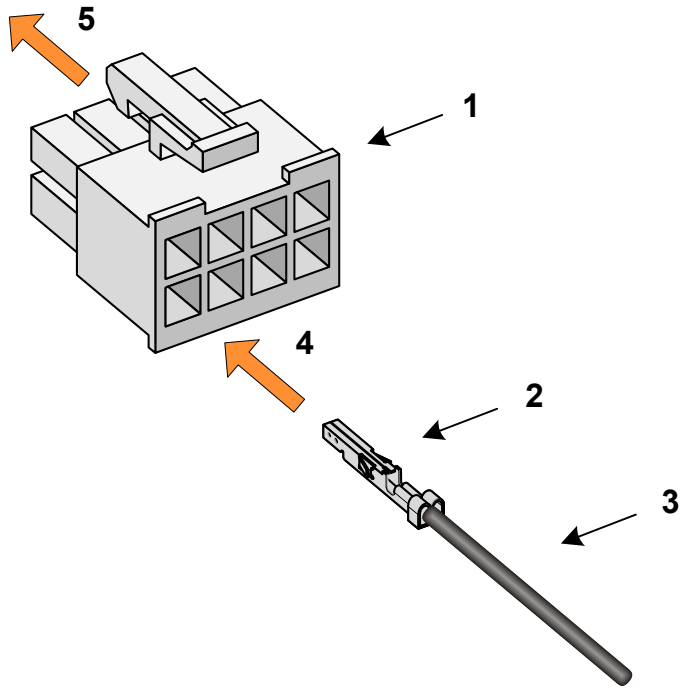


Figure 43: Molex connector frames and crimp terminals

Legend to Figure 43:

1 Molex connector frame, 8 circuits, for use with strain relief, type 39-01-2085

2 Mini-Fit HCS™ crimp terminal (AWG 18 … AWG 24), type 39-00-0038 or 39-00-0039

3 Wire (AWG 18 … 24)

4 Inserting the Mini-Fit HCS™ crimp terminal into the connector frame

5 Plugging the connector frame in its FAMO2 or FAMO2-F interface

The crimp terminals (2) accept wires as follows:

- Wire diameter: typically 0.8 mm (AWG 20)
- Wire insulation diameter: 1.3 … 3.1 mm

For each connection you need to crimp a Mini-Fit HCS^{TM} crimp terminal on the corresponding cable. The crimp terminal is then inserted with the cable fit into the Molex connector frame in the appropriate position.

A connector set with connector frame (1 frame 4x2) and crimp terminals (8 Mini-Fit HCS^{TM}) is recommended for optional alarm signal connections.

For details of the crimp process, refer to the instructions provided with the crimp tool (for the crimp tool reference, refer to Table 10: "Checklist for tools (installation)" (on page 67)).

3.7.2.2 Alarm Signal Input Interfaces

The FAMO2 or FAMO2-F provides 3 interface groups for the monitoring of alarm signals (inputs) for totally 12 alarm signals. Each interface group can handle up to 4 alarm signals.

Each alarm interface group F3, F4, F5 uses a pin assignment as follows:

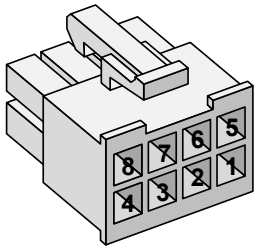


Figure 44: Molex connector frame alarm signal inputs

Table 3: Alarm input interfaces pin connection

Alarm interface group			Connector pin	
F3	**F4**	**F5**	**Signal**	**GND**
Alarm_in 1	Alarm_in 5	Alarm_in 9	8	4
Alarm_in 2	Alarm_in 6	Alarm_in 10	7	3
Alarm_in 3	Alarm_in 7	Alarm_in 11	6	2
Alarm_in 4	Alarm_in 8	Alarm_in 12	5	1

Standard crimp contacts are connected and implemented within the individual Molex connector frames as required for monitored alarm signals.

If the DUPF2 is implemented it uses 2 of the 12 alarm inputs. For details, refer to section 3.7.2.3 DUPF2 Alarm Interface (on page 52).

3.7.2.3 DUPF2 Alarm Interface

The DUPF2 unit supervises the two power supply circuits PSC1 and PSC1. Two alarm outputs are provided on the DUPF2 unit which can be connected to the alarm inputs of the FAMO2 or FAMO2-F unit. The DUPF2 alarm outputs are implemented as “breaking” contacts, i.e. the alarm signals provide ground potential if the alarm is inactive.

The DUPF2 option includes a cable for the alarm connection. The cable side to be connected to the DUPF2 provides a 3x2 Molex connector, the cable side to be connected to the FAMO2 or FAMO2-F provides a 4x2 way Molex connector.

Molex connector (DUPF2 side) Molex connector (FAMO2 side)

Figure 45: DUPF2 alarm cable

The DUPF2 alarms are connected to one of the 3 alarm interfaces F3, F4, F5 on the FAMO2 or FAMO2-F, normally to the F5 interface. The DUPF2 connects to the lowest 2 alarm inputs of an alarm interface group via the Molex connector:

Table 4: DUPF2 alarm input interfaces pin connection

Alarm interface group			DUPF2 interface		Connector pin	
F3	**F4**	**F5**	**Alarm**	**Alarm active**	**Signal**	**GND**
Alarm_in 1	Alarm_in 5	Alarm_in 9	Power supply PSC1 failed	open	8	4
Alarm_in 2	Alarm_in 6	Alarm_in 10	Power supply PSC2 failed	open	7	3
Alarm_in 3	Alarm_in 7	Alarm_in 11	not used		6	2
Alarm_in 4	Alarm_in 8	Alarm_in 12	not used		5	1

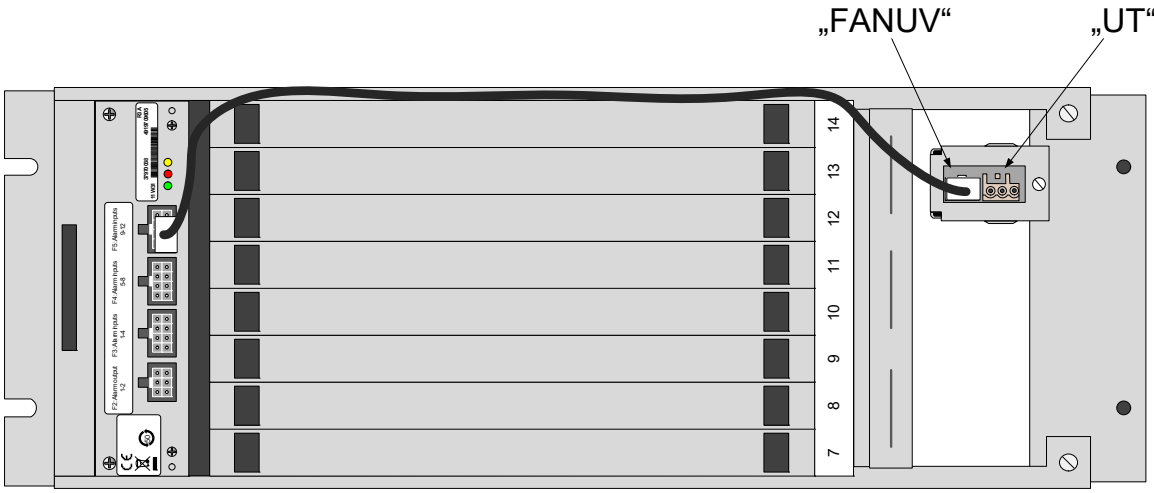


Figure 46: DUPF2 alarm interface connection

Install the DUPF2 alarm cable according to the following instruction.

→ DUPF2 alarm interface connection. Proceed as follows:

1. Plug the DUPF2 alarm cable to the alarm output of the DUPF2 unit, designated with “FANUV”.
2. Tie the DUPF2 alarm cable from below the cable clamp along the right bracket of the sub-rack up to the FAMO2 or FAMO2-F.
3. Plug the Molex connector to the F5 interface of the FAMO2 or FAMO2-F.
4. Check the lock of the Molex connector for safe fit.
5. Arrange the cable in such a way that it does not block the fixing slots for the subrack front cover in the brackets.

End of instruction

Please note:
The DUPF2 alarm connector does not use the remaining 2 alarm inputs. If required these inputs can be used for other alarm signals.

3.7.2.4 Alarm Signal Output Interface

The FAMO2 (R3) or FAMO2-F provides the interface F2 for the output of the 2 system alarm signals:

- Service Affecting Alarm (SAA)
- Service Not affecting Alarm (SNA)

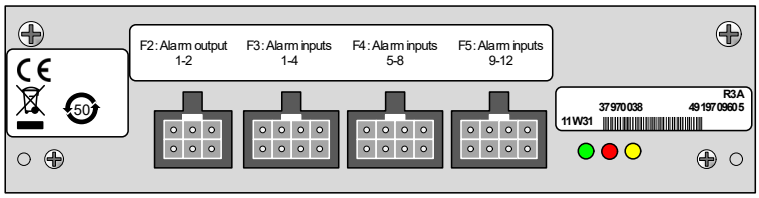


Figure 47: FAMO2 (R3) and FAMO2-F alarm signals output interface

The alarm signal output interface F2 uses a pin assignment as follows:

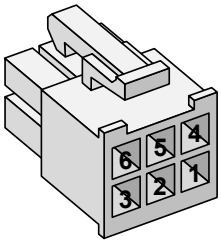


Figure 48: Molex connector frame system alarm signal outputs

For the connection of alarm signals Mini-Fit HCS™ crimp terminals are implemented within the Molex connector frame as described in the table below.

Table 5: Alarm output interface pin connection

Alarm Type		**Pin**		**Pin**		**Pin**
Non Urgent	SNA_make	6	SNA_break	5	SNA_com	4
Urgent	SAA_break	3	SAA_make	2	SAA_com	1

SxA_make: The contact closes if the alarm becomes active = **AC**

SxA_break: The contact opens if the alarm becomes active = **AO**

SxA_com: The contact connects or interrupts to the common signal = **COM**

STOP

Risk of operating trouble!

The connector layout for the **break** and **make** contacts of the **Service Affecting** and **Service Not Affecting** alarm signals is inverted!

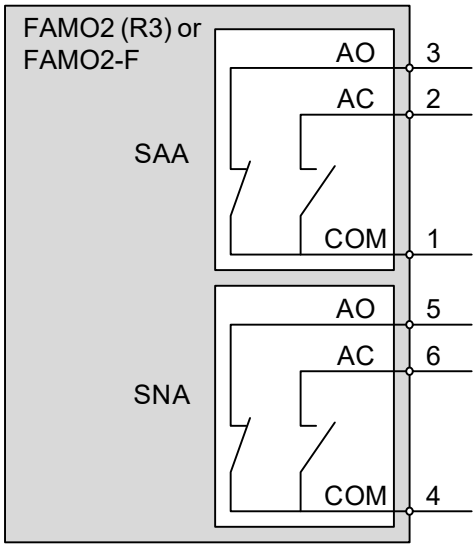


Figure 49: Alarm output contact scheme (no alarms, inactive state)

The alarm output use relay contacts which are galvanically isolated from the other circuits.

3.8 Final Steps

3.8.1 Tightening of Screws

The FOX612 subrack equipment is now completely installed in the rack. If required, the individual subracks can be readjusted for their final position in the rack.

If all equipment is in its final position the M6 screws must be tightened definitively. For recommended torques, refer to section 2.4.6 Torques (on page 26).

3.8.2 Cable Clamp, Earthing Bar and EMC Clips

The FOX612 subrack provides a cable clamp and earthing bar.

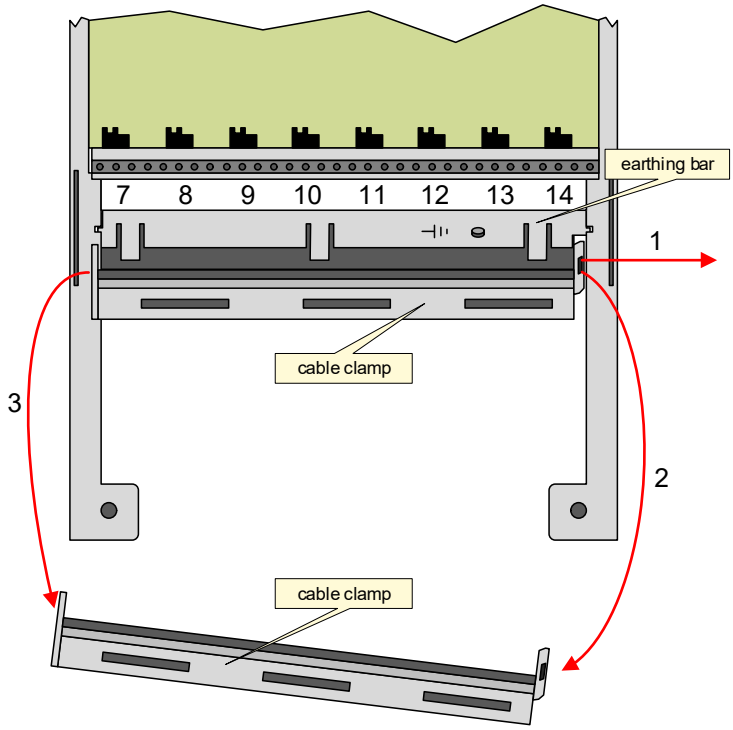


Figure 50: Removal of the cable clamp

To remove the cable clamp from the earthing bar proceed as follows:

→ Cable clamp removal. Proceed as follows:

1. Pull the spring bracket to the right (1).
   A screwdriver might help to unlatch the spring bracket.
2. Remove the right end of the clamp from the earthing bar by rotating it outward (2).
3. Unhook the left end of the clamp from the earthing bar and remove the clamp completely (3).

End of instruction

Please note:
For re-installation of the cable clamp the signal cables must be fixed on the cable tray and connected to the interfaces of the units!

To re-install the cable clamp to the earthing bar proceed as follows:

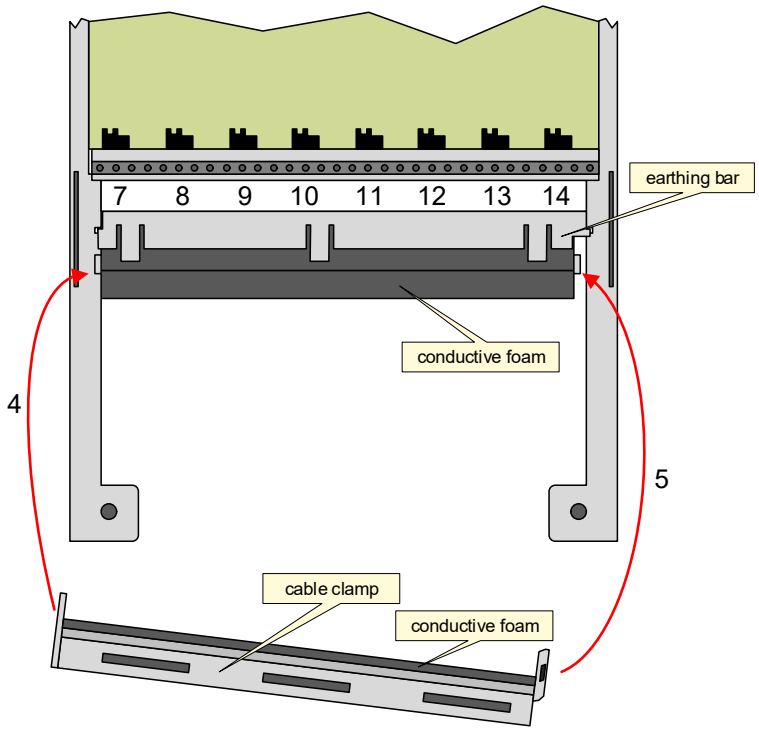


Figure 51: Installation of the cable clamp

→ Cable clamp installation. Proceed as follows:

1. Check the placement of the conductive foam on the earthing bar and on the cable clamp. Realign if necessary.
2. Check the fit of the signal cables on the earthing bar. Realign if necessary.
3. Hook the left end of the clamp onto the earthing bar (4).
4. Rotate the right end of the clamp inward onto the earthing bar until the spring bracket to the right snaps in (5).
5. Check both spring brackets for correct fit.

End of instruction

STOP

Risk of operating trouble!

Attention to EMC properties!

When plugging units which are accessed with optical cables only, the conductive foams in the cable clamp and in the earthing bar will be separated by the insulated cables. The resulting gap impairs the specified EMC characteristics.

→ Hitachi Energy offers EMC clips providing an electrical connection between the conductive foams in the cable clamp and in the earthing bar.

→ The EMC clips have to be pushed into the conductive foam of the earthing bars to close the gap.

→ EMC clips have to be used where three or more units with optical cables are plugged in adjacent slots.

→ Three evenly spaced EMC clips have to be used to maintain the specified EMC characteristics of the FOX612.

→ Please order the required amount of EMC clips at Hitachi Energy.

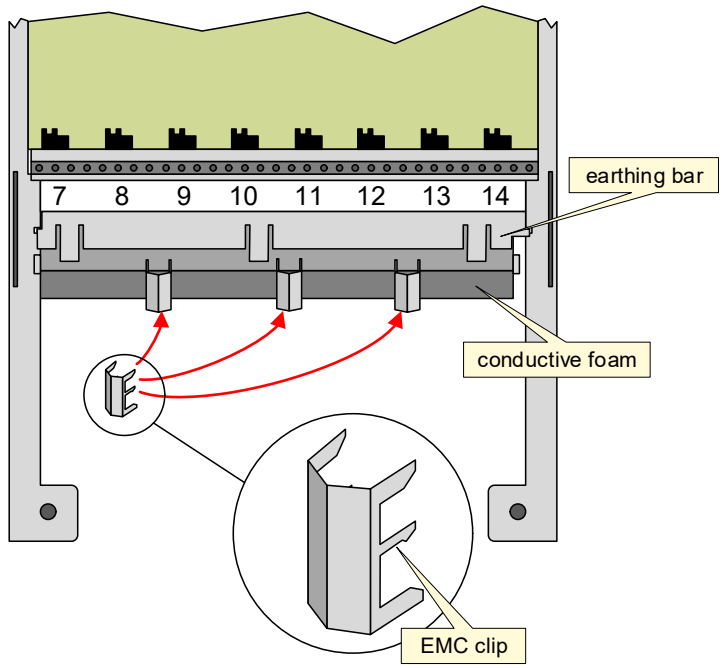


Figure 52: Mounting of three EMC clips to the earthing bar

3.8.3 Units and Signal Cables

3.8.3.1 Inserting Units in the Subrack

Normally the FOX612 subrack is delivered without units. The units are separately shipped. For commissioning or replacement you must insert units into the FOX612 subrack.

You can skip this paragraph if all units already occupy their position in the subrack.

NOTICE **Electrostatic discharges. Risk of equipment damage!**

Units are sensitive to electrostatic discharges!

→ Use a grounded protective wristband when handling units!

→ Keep the units in their ESD protective plastic bags until you use the units!

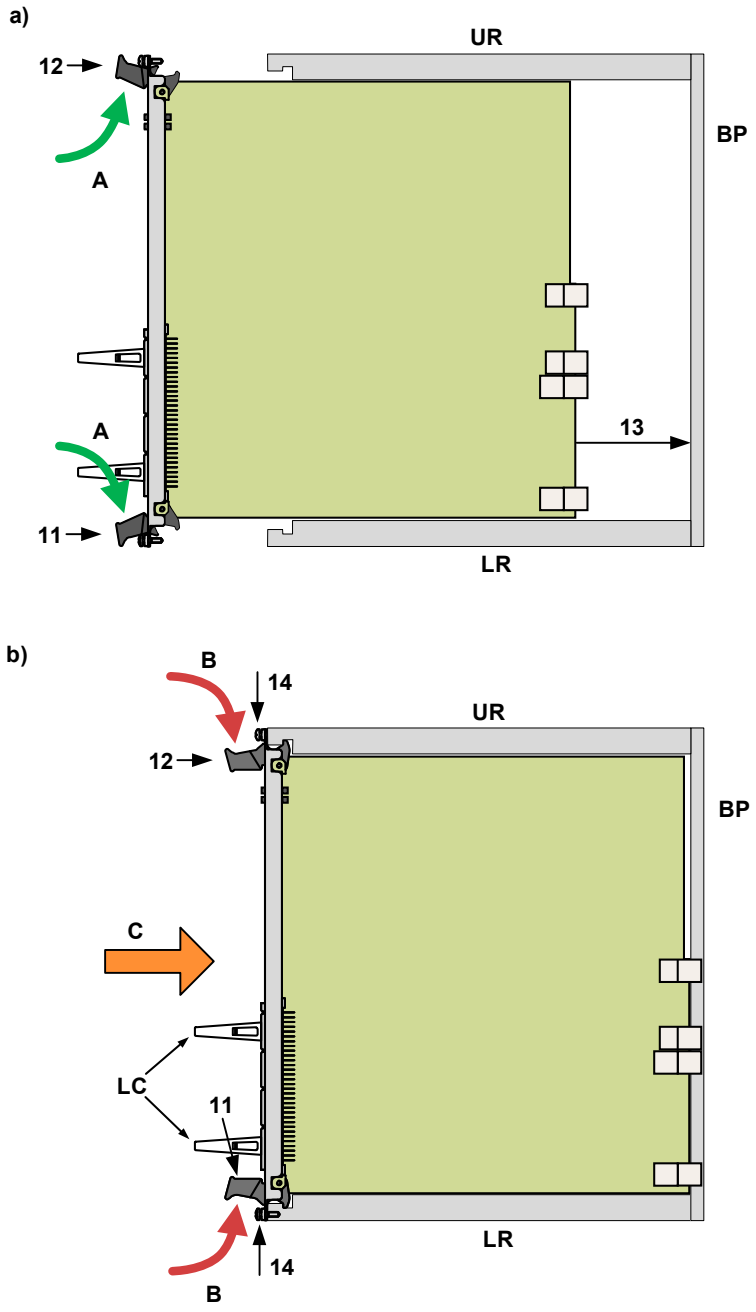


Figure 53: Insertion of units in the subrack

Legend to Figure 53:

BP	Backplane with connectors
UR	Upper Rail in the subrack
LR	Lower Rail in the subrack
LC	Latching clips (not available on all units!) (for details of latching clip assembly, please refer to section 3.8.3.2 Connecting Signal Cables (on page 59)).

→ Unit insertion. Proceed as follows:

1. Remove the cable clamp from the earthing bar of the subrack. Follow steps (1) to (3) in Figure 50.
2. Identify the slot for the plug-in unit and engage the unit to the upper and lower rails. Slide the unit half way in as shown in the figure above, part a).

3. Insert the plug-in unit as follows:
   - Push both levers (11), (12) in outward position (A).
   - Slide the unit in until its connectors touch the front of the backplane connectors (13). Do not insert completely!
   - To engage the unit with the backplane connectors, press carefully and simultaneously the levers (11) and (12) inwards (B) while at the same time pressing (C) the via the unit front into the subrack.
   - The lever movement and insertion force will engage the connectors of the unit to the backplane connectors.
   - Tighten both fixing screws (14) to fix the unit to the subrack (for recommended torques, refer to section 2.4.6 Torques (on page 26)).
4. Repeat the steps 2 and 3 for all units to be inserted.

End of instruction

Risk of operating trouble!
Using force to insert a unit may damage the connectors, the unit, its components, or the subrack.

→ Never use force to insert a unit!

3.8.3.2 Connecting Signal Cables

→ Signal cable connection: Proceed as follows:

1. Applicable for DIN based front connectors only:
   Check for latching clips (refer to positions (LC) in Figure 53). If no clips are fitted, insert clips to the positions shown in Figure 53. The latching clips are packed with the original cables from the manufacturer or provided separately.
2. Plug the connector of the signal cable onto the front connector of the unit.
3. Attend to the click of the latching system (if provided) or secure connector if applicable.
4. Realign the cable(s) on the cable tray. Ensure close contact of the dismantled cable shield to the earthing bar.
5. Fix the cable(s) firmly (e.g. using cable ties) on the cable tray.
6. Repeat the steps 1 to 5 for all units and interfaces.

End of instruction

Please note:
Latching clips are required for some of the connectors (DIN 41 612 based interfaces):

→ Latching clips are packed with the original cables from the manufacturers.

3.8.3.3 Clamping Cables to the Subrack Earthing Bar

Clamp the cables to the bar only if all cables are installed and properly arranged with respect to the units and the cable tray:

→ Cable clamping. Proceed as follows:

1. Snap in the cable clamp and close the earthing bar. For details of this procedure, refer to section 3.8.2 Cable Clamp, Earthing Bar and EMC Clips (on page 55) and Figure 51: "Installation of the cable clamp" (on page 56). Proceed as instructed in the corresponding paragraphs.

End of instruction

Risk of operating trouble!
Attention to EMC properties!
Assure the specified EMC characteristics of the FOX612.
→ Connect all shields properly to the earthing bar of the subrack.

3.8.3.4 Removing Units

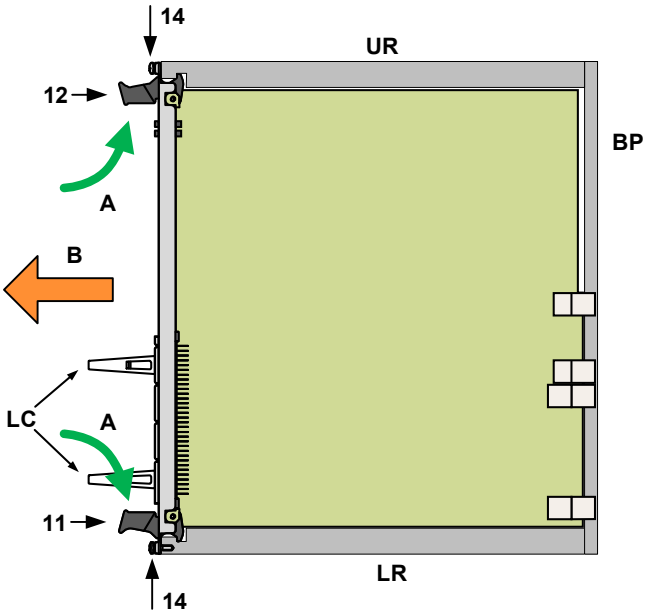


Figure 54: Remove of units from the subrack

Legend to Figure 54:

BP	Backplane with connectors
UR	Upper Rail in the subrack
LR	Lower Rail in the subrack
LC	Latching clips (not available on all units!)

NOTICE **Electrostatic discharges. Risk of equipment damage!**
Units are sensitive to electrostatic discharges!
→ Use a grounded protective wristband when handling units! Pack units into an ESD protective bag immediately after removal. The original packaging provides the best protection for the units.

To remove units from the subrack you have to reverse the steps required for the installation of units.

→ Unit removal. Proceed as follows:

1. Remove the front cover from the subrack.
   - Refer to Figure 56: "Removing the front cover from the subrack" (on page 63) and proceed as instructed in the corresponding paragraphs.
2. Remove the cable clamp from the subrack earthing bar.
   - Refer to section 3.8.2 Cable Clamp, Earthing Bar and EMC Clips (on page 55) and proceed as instructed in the corresponding paragraphs.
3. Unplug the connector(s) of the signal cable
   - Check for latching clips (refer to positions (LC) in Figure 54) or other strain relieve devices.

- Separate at the same time both clips (or similar devices) from their notch in the cover of the connector.
- Unplug the connector now.

4. Remove the unit (Figure 54)
   - Unscrew both fixing screws (14) of the unit.
   - To disengage the unit from the backplane connectors push both levers (11) and (12) simultaneously in outward position (A). Allow the unit to move outside while pressing on the levers.
   - Remove (B) the unit from the subrack.
   - Handle the unit according to the recommendations for ESD sensitive devices.
5. Repeat the steps 3 and 4 for all units to remove.

End of instruction

Please note:
Screws (14) that are unscrewed in such a way that they protrude from the front panel of the unit can block the outward movement (A) of the levers.

3.8.4 Front Cover

3.8.4.1 Mounting the Front Cover

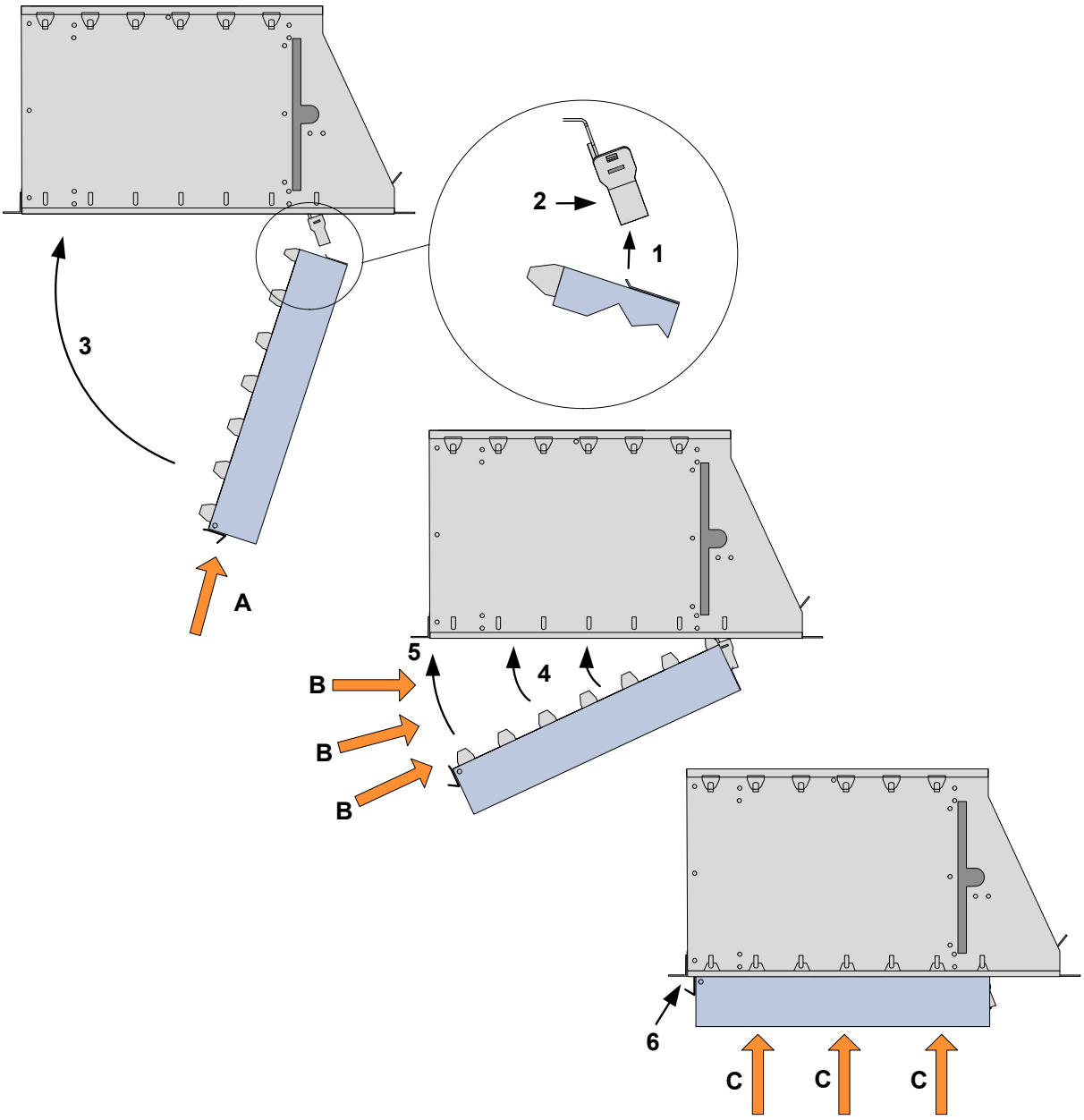


Figure 55: Installing the front cover to the subrack

Please note:
The front cover also covers the earthing bar.

Please note:
The description below applies for a horizontally installed FOX612.

→ Front cover installation. Proceed as follows:

1. Move the front cover close to the subrack and rotate it outwards (with respect to the subrack) as shown in Figure 55.
2. Hinge the right lids (1) of the front cover into the slots of the earthing bar (2) and press (A) it firmly into the slots.

3. Rotate the front cover inwards to the front of the subrack (3) while applying a constant force (B) in the direction of the earthing bar.
4. Align the upper and lower lids (4) of the front cover to the slotted rails of the FOX612 sub-rack.
5. Align the left hand lock of the front cover to the slotted rail at the left edge of the subrack (5).
6. Close the cover firmly (C). Listen for the click of the left hand lock (6).
7. Check the cover for correct fitting.

End of instruction

3.8.4.2 Removing the Front Cover

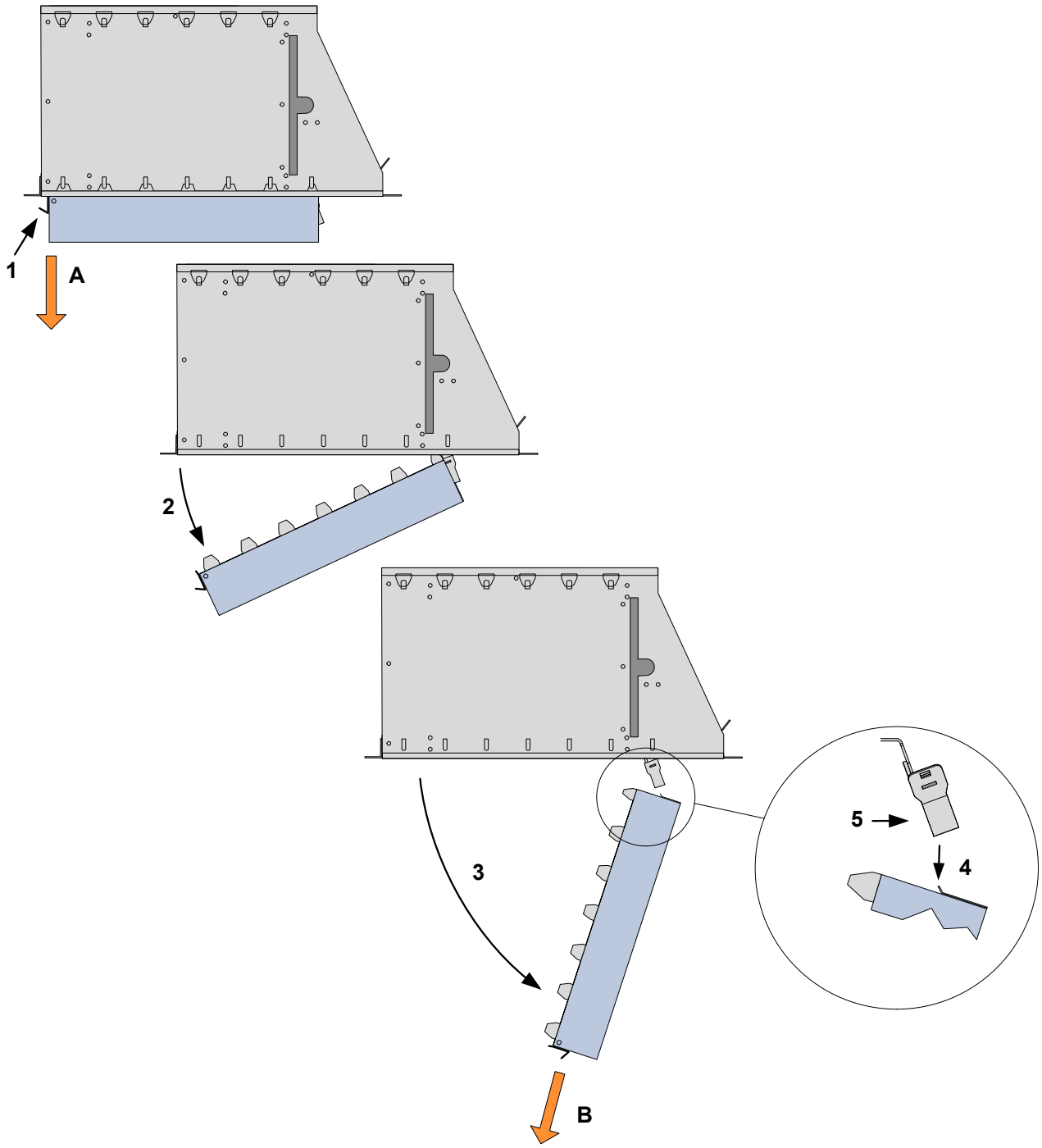


Figure 56: Removing the front cover from the subrack

Please note:
The description below applies for a horizontally installed FOX612.

→ Front cover removal. Proceed as follows:

1. To unlock the cover tear the outer edge of the left hand lock (1) and pull the front cover outwards (A).
2. Rotate the left edge of the front cover outwards (2).
3. Continue rotating the cover outward (3) as shown in Figure 56.
4. Remove the right lids of the front cover (4) from the slots of the earthing bar (5).
5. Remove the cover completely (B).

End of instruction

Risk of operating trouble!
Attention to EMC properties!
The FOX612 subrack without its front cover mounted does not comply with all EMC standards.

→ To make sure the FOX612 complies with EMC standards, fit the front cover after installation work has been completed as described in section 3.8.4.1 Mounting the Front Cover (on page 62).

4 Checklists

4.1 Overview

The checklists in Table 6 to Table 10 help you to prepare equipment and material for installation. There is a checklist provided for the

- FOX612 equipment (NE and units)
- Cables
- Material
- Tools

4.2 NE and Units

Table 6: Checklist for the FOX612 equipment and options

Description	Identification	Quantity	
		Unit	Remark
FOX612 subrack		1	
Front cover subrack		1	Provided with the subrack
Adapter set for 19-inch rack installation 4 HU		1	Equally provides the cable tray for rack installation
Adapter set for ETSI rack installation 4 HU (optional)		1	ETSI extension for the 19-inch adapter
Adapter kit for wall-mounting		1	Equally provides the cable tray for wall installation
-48/-60 VDC power cable (subrack to cable tray)		1	Provided with the subrack
Control unit	CESM1, CESM2 or CESM3	1 (2)	(Unit protection)
Fan unit (optional)	FAMO2	1	Provides also the alarm interfaces
Alarm unit (optional)	FAMO2-F	1	Provides the alarm interfaces
Dual power supply unit (optional)	DUPF2	1	Equally provides the alarm cable
Air filter (optional)			Recommended in dusty environment
Service units			Type and number as required

Please note:
The 19-inch adapter set contains the following installation material:

- 2 screws to fix the subrack to the adapter.

Please note:
The ETSI adapter set contains the following installation material:

- 4 captive nuts (for the ETSI rack).
- 8 screws to fix the adapters in the ETSI rack (captive nuts), and to fix the subrack and cable tray to the ETSI adapters (integrated M6 nuts).

Please note:
The wall-mounting adapter kit contains the following installation material:

- 2 screws to fix the FOX612 to the adapter (integrated M5 nuts).

Please note:
For the contents of the standard packaging, refer to section 3.1 Unpacking and Equipment Check (on page 27).

4.3 Cables

4.3.1 Cables for Alarm Interfaces

There are no prefabricated cables available for the FAMO2 or FAMO2-F alarm interfaces. Connector sets are available to allow on-site manufacturing of cables and connections.

Table 7: Checklist for the alarm interface connector set

Description	Quantity	
	Unit	Remark
Connector set for alarm signal input interfaces: - Molex connector frame 2 x 4 - 8 Mini-Fit HCSTM crimp pins (AWG 18 … AWG 24)		Connects 1 of the 3 FAMO2 or FAMO2-F alarm input interface groups
- Alarm signal output - Molex connector frame 2 x 3 - 6 Mini-Fit HCSTM crimp pins (AWG 18 … AWG 24)		Connects the alarm output interface group of the FAMO2 (R3) or FAMO2-F

The wires for the alarm interfaces are required only if the corresponding interfaces are used (optional). For information on corresponding wires (one end terminated with the appropriate crimp terminal), refer to section 3.7.2.1 Interfaces and Connectors (on page 50).

Please note:
The alarm connector set contains also the material for other interfaces not available on the FAMO2 (R2) unit. This material is not used with the FAMO2 (R2) unit.

4.3.2 Computer Cables and Adapters

The connection of the control unit to the local craft device or to the management communication structure (such as a LAN) requires standard computer cables.

Table 8: Checklist for the computer cables

Description	Quantity	
	Unit	Remark
Ethernet electrical cables:		Uplink and/or management interfaces
FOX612 side: - terminated RJ45, signals crossed over [=], shielded, up to 1 Gbit/s	(4) or (2)	Electrical interfaces: up to 4 per CESM1 up to 2 per CESM2 or CESM3
FOX612 side: - terminated RJ45, signals 1:1 [X], shielded, up to 1 Gbit/s	(4) or (2)	Electrical interfaces: up to 4 per CESM1 up to 2 per CESM2 or CESM3
Ethernet optical cables:		Uplink and/or management interfaces
FOX612 side: - SFP cage, connector and fiber specification depend on SFP module	(2) or (4)	Optical interfaces: up to 2 per CESM1 up to 4 per CESM2 or CESM3

4.3.3 Signal Cables

Hitachi Energy provides cables for units with traffic interfaces. For most units one cable connects all the interfaces of the unit.

For information about signal cables, refer to the user manuals of the units, or refer to [1KHW002498] Product Guide “FOX61x cables”.

4.4 Installation Material

Table 9: Checklist for material

Description	Quantity	
	Unit	Remark
Screws flat head (slot or Phillips) M6x12 (for 19-inch rack installation only)	4	per subrack
Captive nuts for M6 screws (for 19-inch rack installation only)	4	per subrack
Screws flat head (slot or Phillips) M6x8 (for 19-inch and ETSI rack installation only)	2	included with the 19-inch adapter/cable tray
Screws flat head (slot or Phillips) M6x12 (for ETSI rack installation only)	8	included with the 4 HU ETSI adapters
Captive nuts for M6 screws (for ETSI rack installation only)	4	included with the 4 HU ETSI adapters
Special screws flat head (Phillips) M5x6 (for wall-mounting only)	2	included with the wall-mounting adapter
Screws flat head max. diameter 6 mm (to fix the wall-mounting adapter)	3	The type of the screws depends on the set-up of the installation.
Screw flat head (slot or Phillips) M4 [1]	1	Bonding point
Washer for 4 mm screws [1]	1	Bonding point
Crimp lug for 4 mm screws for the subrack earthing cable [1] (10 mm^2 cross section)	1	Bonding point
Cable ties	1	per signal cable
Latching clips for connectors - provided with signal cables - ordered separately for connector (sets)	2	per standard connector
Labels for cables		as required

1. Only required if the subrack earthing is done via an earthing cable.

4.5 Tools

The installation of the subrack and the cable tray requires no special tools. The checklist below provides an overview of the most important standard tools required for the installation.

Table 10: Checklist for tools (installation)

Description	Identification	Quantity	
		Unit	Remark
Screwdriver for standard slot head screws	no. 1- 4	1	Units, subrack, general use
Screwdriver for Phillips head screws	no. 1- 3	1	Units, subrack, general use

Table 10: Checklist for tools (installation) (continued)

Description	Identification	Quantity	
		Unit	Remark
Crimp tool for Mini-Fit HCSTM crimp terminals (AWG 18 … AWG 24) Parallel action Hand tool for 5556/ 5558 Terminals	69008-0724	1	Alarm cables
Wire stripper		1	General use
Wire cutter		1	General use
Flat pliers		1	General use
Connection tool for MDF terminal strips		1	Brand of MDF
Multimeter (Volt, Ampere, Ohm)		1	General use, to check the polarity of power supply etc.
Wrist strap (bonding point M4 preferred)		1	Unit handling
Bench mats		1	Unit handling

4.6 Test Equipment

The installation of the basic equipment (subrack, control unit, power units) does not require special test equipment. Requirements for test equipment for the traffic units and signals depend on the type of interfaces and signals to be tested.

Please contact Hitachi Energy for recommendations on test equipment, if you need information on suitable test equipment for a particular traffic interface of the FOX612.

5 Equipment Disposal

5.1 General

The term “equipment” used below refers to and includes the Full Hybrid Multi-Service Access & Transport Platform provided by Hitachi Energy such as pluggable units, electronic assemblies, metalwork, and cables.

5.2 Decommissioning

The decommissioning of the equipment should be done in the following steps.

- Disable the application in which the equipment is used. This is of special importance when protection signaling is used.
- Switch OFF the power supply of the equipment. Isolate and disconnect the external power supply of the equipment.
- Open the isolating terminals from the external cables.
- Disconnect the external wiring of the equipment. This should be done carefully using the plant drawings so that no other wiring is disconnected by mistake.

WARNING **Non-observance can lead to death or injury.**

Removal of earthing or grounding wires from the rack or subrack while the rack or subrack is powered may cause uncontrolled and dangerous currents or voltages.

→ Prior to the removal of any earthing or grounding wires or appliances make sure the equipment powering is switched off and all power and signal cables are physically disconnected.

- In case the complete rack is to be dismounted, remove the earthing or grounding wires from the rack.
- In case the complete rack is to be dismounted, the bolts for fastening the rack to the base frame or floor must be carefully removed giving support to the rack at the same time. The rack can now be lifted and dismounted. It is preferable to keep the rack in horizontal position if no external support can be given to the rack in vertical position.
- In case only the FOX612 subrack is to be removed from the rack, first disconnect the internal wiring and power supply between the FOX612 subrack and the terminal blocks, then remove the earthing or grounding wires if applicable. Now dismount the subrack by unscrewing the screws from the front.
- If the FOX612 subrack or its modules are to be reused, they should be handled and packed properly following precautions for ESD protection.

5.3 Disposal

CAUTION **Non-observance could result in minor or moderate injury.**

After usage the equipment must be disposed of properly as electronic waste according to WEEE (waste of electronic and electric equipment), in accordance with the local applicable disposal regulations.

→ The equipment must not be disposed of with domestic waste.

→ Only a reputable and competent recycling company should deal with the equipment, which may contain items that could be hazardous during dismantling operations.

For disposal, the regional and national regulations for electrical and electronic waste have to be followed.

The modularity of the equipment allows to separate component boards and casing, thus giving the opportunity for recycling.

6 Annex

6.1 Associated Documents of Standard Bodies

Table 11: Associated documents of standard bodies

Body	Standard	Title
ETSI	EN 300 132-2 V2.3.6	Equipment Engineering (EE); Power Supply Interface at the Input to Telecommunications Equipment; Operated by Direct Current (DC)
ETSI	ETSI EN 300 253 V2.2.1	Environmental Engineering (EE): Earthing and bonding configuration inside telecommunication centers
IEC	IEC/EN 61000-4-2	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques Electrostatic discharge immunity test

6.2 Declaration of Conformity

CE

EC Declaration of Conformity

The FOX61x products as listed below

- FOX612 Subrack
- FAMO2
- FAMO2-F
- DUPF2
- FOX61x Control Unit(s) as stated in the applicable release notes
- FOX61x Service Units as stated in the applicable release notes

if used for the intended purpose, correctly installed and operated according to the applicable user manuals, comply with the European Directives as follows:

Standard	Title
2014/30/EU	Directive on the harmonization of the laws of the Member States relating to electromagnetic compatibility
2014/35/EU	Directive on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
2011/65/EU	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Conformity to the previously mentioned EC directive is proven for complete compliance to the following harmonized standards:

Standard	Title
ETSI EN 300 386 V1.6.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements
IEC 62368-1:2014	Audio/video, information and communication technology equipment - Part 1: Safety requirements
EN 61000-6-2 (2005)	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

Standard	Title
EN 61000-6-4 (2007)	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Please note that the list of compliant products represents the state of product availability at the time when this document has been compiled. The list of compliant products is subject to change with the extension of the FOX61x platform.

The up-to-date EC Declaration of Conformity for the FOX612 is available on request via communication.networks@hitachienergy.com.

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