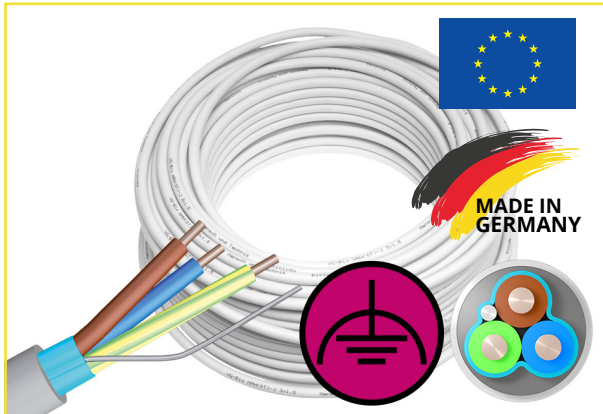




Shielded cables



- Installation cables for effective limitation of alternating electric fields
- no corrosive/narcotic gases are produced in the event of fire. Smoke development remains low
- does not contain plasticisers
- The temperature range (not moved) is - 40 °C to max. + 70 °C, during installation + 5 °C to max. + 70 °C. Outdoor installation is only possible if the cable is not exposed to direct sunlight. Use in hazardous areas is not permitted. The product conforms to the 73/23/EEC Directive (Low Voltage Directive).
- The screening is checked according to TCO'99, Volume I (MPR II) and DIN EN 50279 (measuring distance 30 cm, measurement against earth, free cable run over several metres, no connection areas, field-free laboratory conditions).

The alternating electric field is measured in volts per metre, or V/m for short.

unshielded installation cables:	30 – 80 V/m
foil shielded (N)HXMH(St)-J cable	below 1 V/m
Guideline value for building biological electrical installations	max. 10 V/m

**Order-No.: 300016 / 300258 - 41-4303**  
Short-Desc.: (N)HXMH(St) 3x1,5 - 25 / 100 Metre

**Order-No.: 300017 / 300265 - 41-4325**  
Short-Desc.: (N)HXMH(St) 5x1,5 - 25 / 100 Metre

**Order-No.: 300018 / 300264 - 41-4347**  
Short-Desc.: (N)HXMH(St) 3x2,5 - 25 / 100 Metre

**Order-No.: 300019 / 300269 - 41-4360**  
Short-Desc.: (N)HXMH(St) 5x2,5 - 25 / 100 Metre

### Installation cables

#### (N)HXMH(St)

#### Technical data

length:	25 / 100 Metre
colour:	light gray RAL 7035
cross sections / Ø:	3 x 1,5 mm <sup>2</sup> Ø 10,4 mm ± 0,2 mm + shielding wire 1,0 mm <sup>2</sup>
	5 x 1,5 mm <sup>2</sup> Ø 12,0 mm ± 0,2 mm + shielding wire 1,0 mm <sup>2</sup>
	3 x 2,5 mm <sup>2</sup> Ø 11,6 mm ± 0,2 mm + shielding wire 1,0 mm <sup>2</sup>
	5 x 2,5 mm <sup>2</sup> Ø 13,0 mm ± 0,2 mm + shielding wire 1,0 mm <sup>2</sup>
bending radius::	according to DIN VDE 0298, unmoved ca. 4 x diameter
composition:	core insulation, halogen-free (cross-linked PE polyethylenen 2X11) according to DIN VDE 0276 Teil 604 Sheath: plastic inner sheath and outer sheath halogen-free PE polymer mixture HM2 according to DIN VDE 0250 Teil 214 - Polymers PE-EVA mixture Granules - Flame retardant Aluminium trihydroxide (ATH) Powder. No plasticisers.
wires:	bare conductor, single wire
load: (max.)	250 VAC / 50Hz
protection class:	1 - according to DIN VDE 0295
testing:	DIN VDE 0472, part 266-2-4 test type C or IEC 332.3 TCO'99, Volume I (MPR II) and DIN EN 50279 (measuring distance 30 cm, measurement against earth, free cable run over several metres, no connection areas, field-free laboratory conditions)

#### Scope of application

on, in and under plaster (DIN VDE 0298 Part 3)

dry and damp rooms, wooden stud walls, cavity walls, concrete and masonry (except for direct embedding in vibrated or tamped concrete).

entire home, computer rooms, hospitals, public buildings

for more information:

[www.funktionspotentialausgleich.de](http://www.funktionspotentialausgleich.de)

#### Scope of delivery

installation cable (N)HXMH(St)-J (25 / 100 metre ring)

**Building Biology Electrical Installation**

**Notes for the electrical contractor!**

■ **Shielded (building-safe) electrical installation:**

To minimise the emission of low-frequency alternating electric fields, shielded installation cables and shielded equipment boxes are used.

- For the shielding of the components to be effective, they must be included in the potential bonding. A distinction is made between protective and functional potential bonding.

■ **Definition of protective equipotential bonding:**



(PE, green-yellow) serves protective purposes and is intended to prevent dangerous touch voltages as well as to ensure the rapid tripping of protective devices (e.g. circuit breaker / fuse).

■ **Definition of functional potential bonding:**



(FPA) is used to minimise low-frequency alternating electric fields in shielded installations. In this case, the connection wires of the coated accessory boxes are routed to the FPA rail with the shielding wires (SB) of the shielded installation cables (no further connection to a protective earth conductor). PE and FPA are only connected to the main earthing bar.

To avoid confusion with the protective conductor (PE), the shielding wire (SB) must be insulated or marked magenta (pink/pink) according to DIN EN 60445 (VDE 0197).

■ **Conditions:**

- Solid foundation earth electrode underneath the moisture insulation
- Application of the TN-S or TT system
- Placing shielded installation cables in a star configuration as far as possible
- Use of plaster and cavity wall device boxes in shielded design
- Residual current device with a rated differential current  $I_N \leq 30 \text{ mA}$ .
- Include all shielded end circuits for sockets, lamps and shielded distribution and main circuits.

■ **Distributor:**

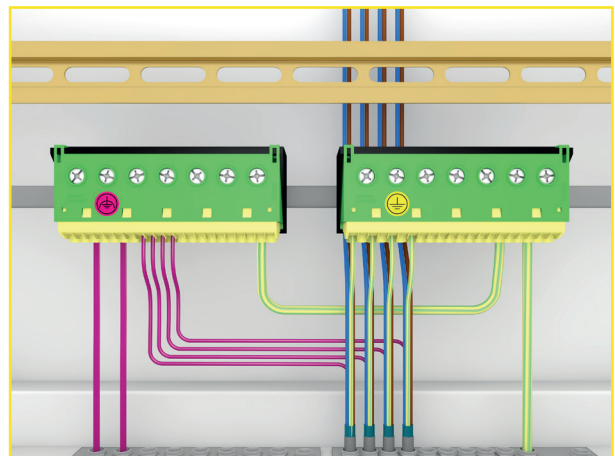
**Step 1: Distribution box**

Use protection class I distribution box (metal housing and metal door) to dissipate the alternating electric fields.

If no distribution box or sub-distribution box with metal housing is available, mount a metal plate (20 cm larger all around than the distribution box) under the box. In the case of plastered-in distribution boxes, work a fine metallic mesh into the wall cut-out. Connect the metal plate or the metal mesh properly to PE with  $\geq 4 \text{ mm}^2$  cross-section. Plastic doors do not allow shielding.

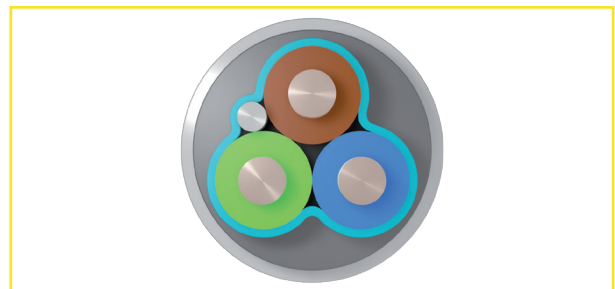
**Step 2: Separate busbar**

for protective potential bonding PE (green-yellow) and functional potential bonding FPA (shielding wire).



Mark functional potential bonding for clarification. Connect main earthing bar to PE as usual, connect busbar FPA and busbar PE with  $\geq 4 \text{ mm}^2$  cross-section.

**Step 3: Wire shielded installation cables**



In shielded installation cables, an aluminium foil is wrapped around the cores to shield the alternating electrical fields.

A bare shielding wire (SB) is incorporated for contacting the foil.

Remove the aluminium foil when stripping the cable.

Connect the shielding wires and the green-yellow wires (PE) separately to the respective busbars, otherwise wire the wires as usual.

**Safety!**

All work on electrical devices and electrical systems must be carried out by a qualified electrician or under their direction and supervision!



Attention: For all work on the electrical installation, always disconnect the mains safely first and also check it!

**Building Biology Electrical Installation**

**Notes for the electrical contractor!**

**Step 4: Labelling FPA**

The labelling field „Functional potential bonding“ should be attached to the circuit distributor. It contains notes on the shielded electrical installation as well as the respective specialists.

Available to cut off in the FPA flyer and to print and cut out following these notes (size DIN A6).

Shielded cables and/or electrically conductive cables and/or electrically conductive wall surfaces are connected.

The shielding wires of the cables as well as the connection of the wall surfaces are connected to the protective conductor rail. If this connection is loosened, the function of the shielding is cancelled.

To increase personal and property protection, all shielded lines and wall surfaces are routed via a residual current circuit breaker with a rated differential current  $\leq 30$  mA.

Applicable standards:  
 DIN VDE 0100-100  
 DIN VDE 0100-410  
 DIN VDE 0100-540  
 DIN VDE 0185-305-3  
 DIN EN 60445 (VDE 0197)

[www.funktionspotentialausgleich.de](http://www.funktionspotentialausgleich.de)

Your electrician:

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Your consulting expert / measurement technician:

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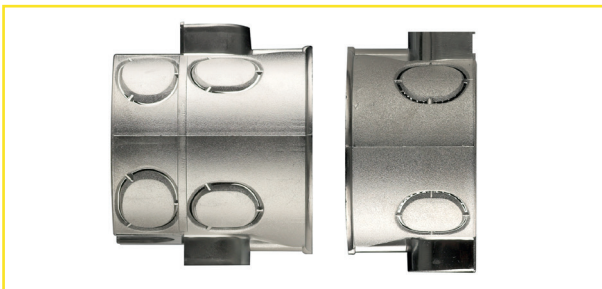
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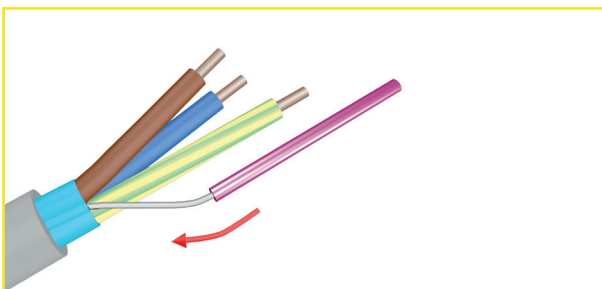
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**■ Device sockets:**

The device boxes (plaster or cavity wall design) are vapour-plated with a conductive metal vacuum coating to shield the alternating electric field and are provided with a connecting wire (transparently insulated).

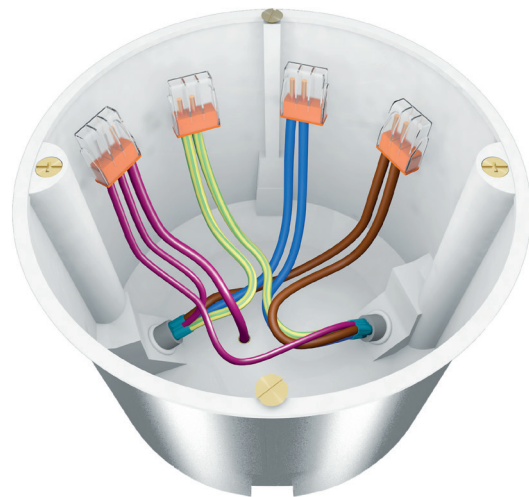


**Step 5: Insulating tube magenta (pink)**



Insulating hose according to EN DIN 60445 (VDE 0197) available from Biologa Danell: ISO-F-FPA - Art.No.: 41-9062 - 760201- magenta - Ø 3,5 mm - Length: 10 Meter

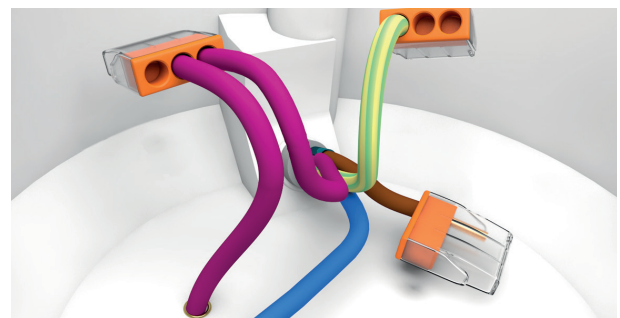
**Step 6: Connect box terminals**



Shielded appliance outlets have a connecting wire magenta (pink) insulated, with connection to the metallic outer coating.

This connecting wire is connected to the FPA in the distribution box.

To do this, insert the magenta (pink) insulated wire and the magenta (pink) insulated connection of the device socket into the socket terminal.



Do not use unshielded cables with shielded wall outlets!

**Safety!**

All work on electrical devices and electrical systems must be carried out by a qualified person or under their direction and supervision!



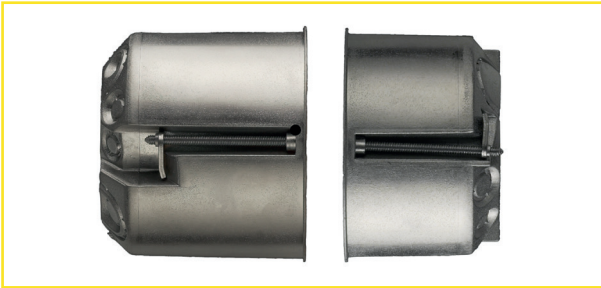
Attention: For all work on the electrical installation, always disconnect the mains safely first and also check it!

**Building Biology Electrical Installation**

**Notes for the electrical contractor!**

**Step 7: Cavity wall installation**

Installation as in step 5 to 6



■ **Specifics:**

**Attention:** please note diffusion barrier in the outer walls of wooden houses!

If no pre-wall installation level is available, there is the option of a windproof insert (among others). Please ask the timber house supplier! Otherwise, moist interior air may penetrate the insulation layer and condensation may occur.

When opening the side tunnel exit of the cavity wall cans, apply knife or chisel from the inside and cut out, **do not press**.

Caution when working below living room temperature, material becomes brittle.

**Typically used products for building biological (shielded) electrical installation**

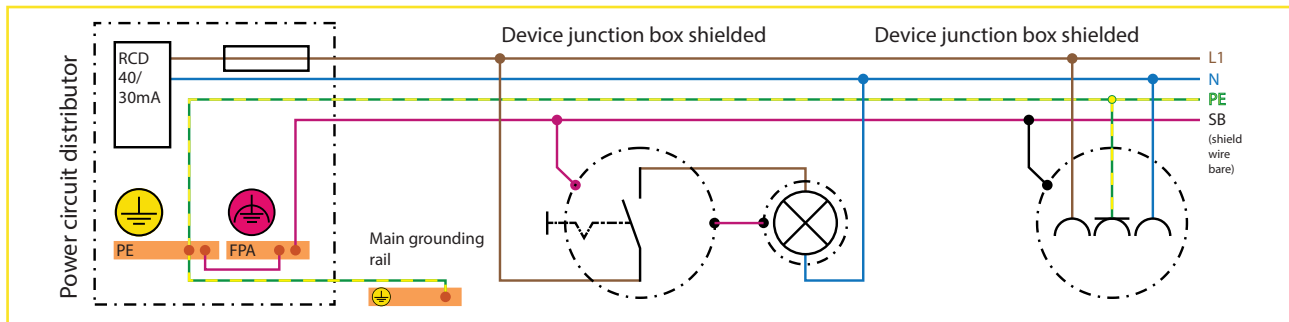
- Insulating tube magenta (pink)  
Biologa Danell: ISO-S-FPA
- Box connecting terminals
- Labelling field „Functional potential bonding (FPA)“.  
Biologa Danell - FPA flyer or printout last page
- Installation cable halogen-free (N)HXMH(St)-J  
Biologa Danell:  
3 x 1.5 mm<sup>2</sup>, 5 x 1.5 mm<sup>2</sup>, 3 x 2.5 mm<sup>2</sup>, 5 x 2.5 mm<sup>2</sup>
- Appliance boxes with conductive coating and connection for FPA
- Plaster junction switch box (deep), Plaster junction switch box (flat), Cavity wall junction switch box (deep) Biologa Danell: UPSD, UPASD
- Cavity wall switch box (flat), junction box (including cover).  
Biologa Danell: HWSD, HWASD, HWAK

**Safety!**

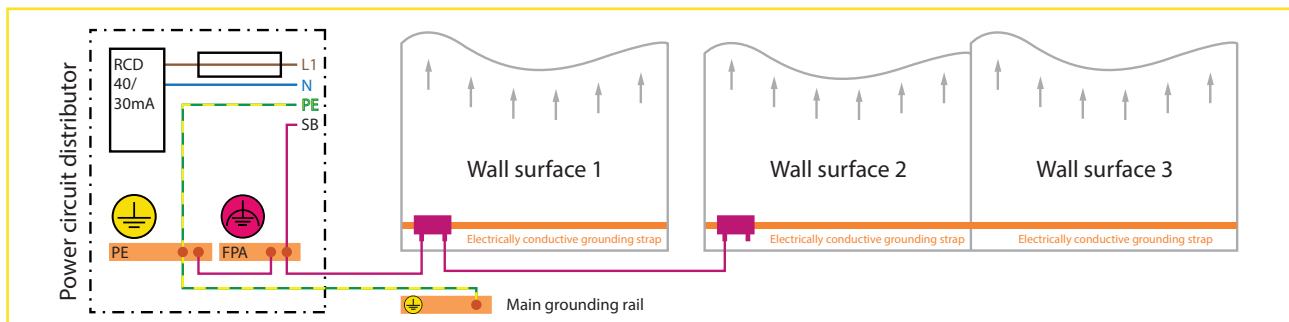
**All work on electrical devices and electrical systems must be carried out by a qualified person or under their direction and supervision!**



**Attention: For all work on the electrical installation, always disconnect the mains safely first and also check it!**



Wiring diagram Functional potential bonding - Shielded electrical installation.



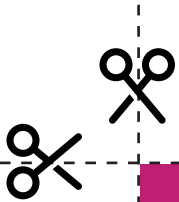
Connection diagram functional potential bonding - shielding surfaces.



**Building Biology Electrical Installation**

**Labelling field distributor - functional potential bonding FPA**

Fill in the necessary data in the labelling field (DIN A6) and then cut it out to stick it in the distribution door or attach it visibly to the documents. You can also enclose the entire FPA flyer with the distributor documents. This is supplied with device boxes and installation cables. See also [www.funktionspotentialausgleich.de](http://www.funktionspotentialausgleich.de)



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[www.funktionspotentialausgleich.de](http://www.funktionspotentialausgleich.de)

Your electrician:

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Your consulting expert / measurement technician:

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