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GEOS 

Product manual
GEOS - Industrial and outdoor enclosure

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About this product manual

This product manual is a project planning and installation manual and has been written for specialist skilled workers. Read this product manual carefully, in order to select, safely install and operate GEOS enclosure systems, and fully utilise the permissible application options that they offer.

Meaning of the symbols



Danger

A failure to observe leads to death or serious injury.

▶ Withdraw from the danger.



Warning

A failure to observe can lead to death or serious injuries.

▶ Withdraw from the danger.



Caution

A failure to observe can lead to injuries.

▶ Withdraw from the danger.



Attention

A failure to observe can lead to material damage.

▶ Avoidance of damage.



Note

Explanatory note

Important supplementary information.

Product abbreviation

This product manual describes different variants of GEOS enclosure systems and accessories. A distinction is made between the following variants:

- Empty enclosure: GEOS-L
- Control cabinets: GEOS-S
- If an accessory can be used for both variants, the abbreviation -L or -S is omitted.

Safety information

The GEOS enclosure systems must be installed and put into operation exclusively by qualified electricians.

Depending on the use of the enclosure systems, operation of the installed equipment by laypersons or authorised outside persons is permitted. If the enclosure system is damaged and the original degree of protection is no longer given, an electrotechnical specialist must assess whether the enclosure system should be taken out of operation. If the enclosure system is accessible to laypersons and protection of the enclosure system against contact with hazardous parts and the penetration of fixed bodies is less than IP3x (protection against contact with tools, wires, foreign bodies, etc. > Ø 2.5 mm) then the distributor must be put out of operation!

The sealing plugs M16 and M20 serve exclusively to close the fastening holes in the box floor. Due to their reduced tightness, they are not suitable for cable insertion with a degree of protection of IP66/IP67. Irrespective of the information in this product manual, the valid standards and regulations apply in their most recent valid form.

Intended use

GEOS enclosure systems are suitable for the installation of:

- Rail mounted devices, in particular protective and control devices
- Low-voltage and switchgear combinations
- Controlling and regulating devices
- Clamps

It is essential to comply with the limitations of use described in this product manual and the limit values specified by the product properties. It is essential to comply with the specifications set out in this product manual regarding the enclosure system mounting, the wiring and the equipment installation.

Technical description of the GEOS enclosure systems

The GEOS enclosure systems belong to a product series of empty enclosures and control cabinets of different sizes and construction variants. The different equipment variants are reflected in the respective name extension.

When utilised in accordance with this product manual, the enclosure systems fulfil the requirements of the standards:

- IEC 62208
- IEC 61439-2
- IEC 61439-3
- IEC 61439-7 (unrestricted access, wall housing, lower edge >0.9 m, medium resistance)
- UL 50, UL 50E
- CSA C22.2 No.94.1, CSA C22.2 No. 94.2
- DNV-GL

The enclosure systems are suitable for application in accordance with the following technical characteristics:

- EN 60204-1

Irrespective of the information provided in this product manual, the specialist is responsible for applying the respective valid standard and the processes described within it.

Project planning aids according to standard

In the following, Spelsberg supports the professional installation of the GEOS enclosure systems according to the standards:

- IEC 61439-2
- DNV-GL

GEOS cabinets and housings (except swivel lever lock) are suitable for installation on all ships, highspeed and highcraft or offshore units that are classified according to DNV-GL.

Areas of application

GEOS enclosure systems are approved for wall mounting. The enclosure systems must be installed on a closed surface. When installing at other locations, e.g. on masts, a closed, stable plate, matched to the enclosure size, must be used as an adapter between the enclosure and the mounting point. When the drainage openings are open, all installation surfaces must protrude at least 20 mm.

With appropriate accessories, they are also suitable for other types of assembly (e.g. mast mounting).

They are suitable for indoor and outdoor installation.

Limits of use according to IEC

The GEOS enclosure systems are suitable for use with the following operational limits, with consideration to the respective valid standard without consultation with Spelsberg.

Ambient temperature

Minimum ambient temperature: – 35 °C (without fittings)

Minimum ambient temperature: – 25 °C (with fittings)

Maximum ambient temperature: + 40 °C

The average temperature over 24 hours must not exceed +35 °C.



Note

Special operating conditions

If GEOS enclosure systems are to be used outside the temperature limits mentioned above, it is necessary to consult with Spelsberg technical sales personnel.

Tel: +49 23 55 / 892-0

Air humidity

The permissible air humidity is determined based on the maximum ambient temperature.

It is 50 % at a maximum ambient temperature of +40°C.

It is 100 % at a maximum ambient temperature of +25°C.

Maximum installation elevation

The maximum installation elevation is limited to

2000 m above sea level, due to the reduction in the dielectric strength and the cooling effect of the ambient temperature at significant elevations.



Note

Special operating conditions

If GEOS enclosure systems are to be used at more than 2000 m above sea level, it is necessary to consult with Spelsberg technical sales personnel.

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Limits of use according to UL/CSA

GEOS enclosure systems comply with the following type rating according to UL 50/CSA 22.2

- TYPE 4X
- TYPE 12K

Application limits according to DNV-GL

- Application limits according to DNV-GL
- Temperature: Class A
- Humidity: Class A
- Vibration: Cla B

Scope of supply

GEOS empty enclosure



Fig. 1: GEOS empty enclosure scope of supply

1	Box
2	Cover (grey, black or transparent)
3	Cover screw set with slide-in tray
4	Sealing plug
5	Short installation instructions



Note

Disposal of the packaging material

Packaging materials must be submitted for recycling.

GEOS control cabinet



Fig. 2: GEOS control cabinet scope of supply

1	Box
2	Frame and door with swivel lever (grey, black or transparent)
3	Frame and door with twist lock (grey, black or transparent)
4	Cover screw set with slide-in tray
5	Sealing plug
6	Short installation instructions



Note

Disposal of the packaging material

Packaging materials must be submitted for recycling.



Note

The GEOS enclosure with swivel lever is supplied without locking cylinder.

- ▶ When selecting the locking cylinder, please consider the operating conditions, e.g. rust protection for outdoor use.

Material characteristics

Insulating material enclosure

GEOS enclosures are produced from thermoplastic (type-tested brand products).

The enclosures are made of insulating material and therefore have no earthing device.

Degree of contamination

The GEOS enclosure systems are designed for use in application areas with a degree of contamination of 3.

Electrical characteristics

The GEOS enclosure systems are approved for use in electrical networks with a rated current of up to 1,000 V AC /1,500 V DC, in which the prospective short circuit current (Icp) does not exceed 10 kA. If a feed with a higher Icp is to be anticipated then a current-limiting protective device with a maximum switch-off current of 17 kA must be included (e.g. AKi-T 201, order no. 786 201 01 from Spelsberg).

Protection rating

IP protection rating

GEOS enclosure systems have an IP protection rating of IP66/67.

Depending on the cable insertion used, the IP protection rating can reduce further.



Note

Use of sealing plugs

The sealing plugs provided by Spelsberg have an IP protection rating of IP54 as a single product. If the sealing plugs are used as intended to cover the screw heads at the internal mounting points, the GEOS enclosure systems achieve IP66 protection rating.

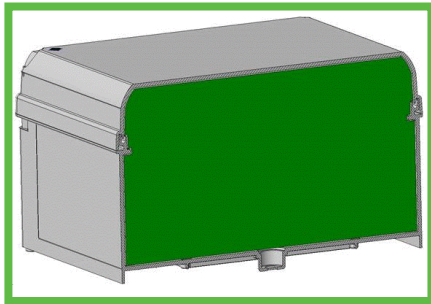


Fig. 3: Enclosed space empty enclosure

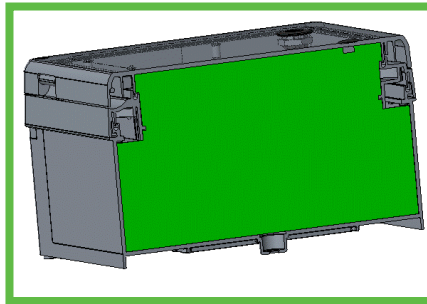


Fig. 1: Enclosed space control cabinet

IK protection rating

The IK protection rating is the measure for the resistance of enclosures to harmful mechanical stresses, in particular impact stresses.

	GEOS-L empty enclosure	GEOS-S control cabinet
Front side	IK09	IK09
Side walls	IK09	IK09

Stress energy:

IK09 \cong 10 Joules

The IK protection rating has been tested at -25°C.

The IK protection rating does not apply to break out openings.

Equipment

Box

The box consists of the box floor, the side walls, 4 or 6 screw points for fixing the cover or frame to the interior.

Box floor

The box floor of the GEOS enclosure systems is equipped with:

- Knockouts for mounting points inside the sealing area
- Knockouts for rear cable insertion 4 combination entries M40/32
- Mounting plug for fastening the installation material
- Screw points for fixing the cover or frame, combined with mounting points outside the sealing area
- Mounting points for external fixing lugs
- Drainage openings

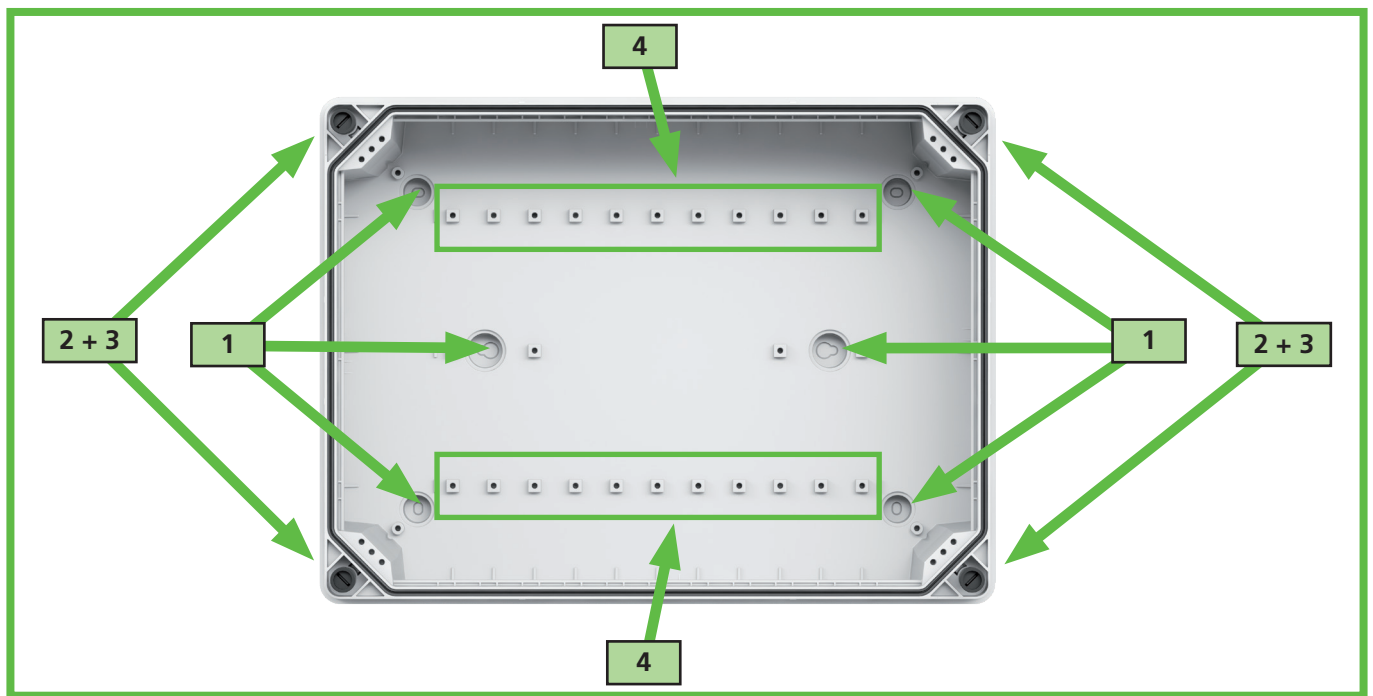


Fig. 4: Box floor front side

1	Mounting points inside the sealing area
2	Mounting points outside the sealing area
3	Screw points (cover and frame mounting)
4	Mounting plugs

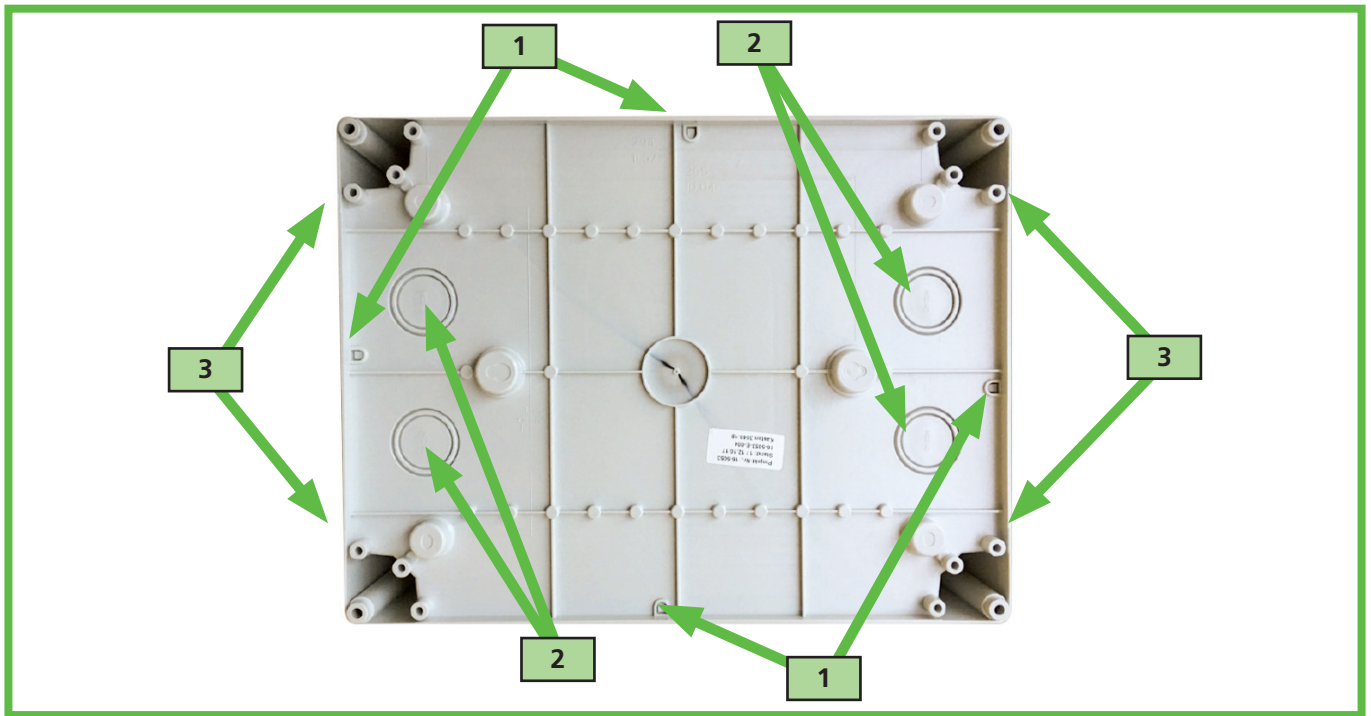


Fig. 5: Box floor rear side

1	Drainage openings
2	Mounting plug for external fixing lugs
3	Pre-embossing for cable insertions

Side walls

The side walls of GEOS enclosure systems have no knockouts.

The following areas, delimited by a small groove, are available for individual drilled holes and cut-outs. A distance of 4 mm from the groove must be maintained for breakthroughs and drilled holes for components.

	Short side wall	Long side wall
GEOS 3030-18	212 x 100 mm	212 x 100 mm
GEOS 3030-22	212 x 147 mm	212 x 147 mm
GEOS 3040-18	212 x 100 mm	312 x 100 mm
GEOS 3040-22	212 x 147 mm	312 x 147 mm
GEOS 4050-22	312 x 147 mm	2 areas each 181x 147mm



Caution Tightness

- ▶ The small circumferential groove limiting the area must be observed when positioning cable insertions. Sealing elements should not lie on the groove.



Note

Use of cable insertions and connector systems in size B24

GEOS enclosure systems xxxx-22 are suitable for vertical mounting of corresponding systems.

At the corners, and in the case of larger enclosure systems also in the middle, there are openings for threaded inserts for mounting the cover and frame. Below the cover or frame, the Drain Protect System for water drainage is provided on the side walls of the box.



Note

The Drain Protect System should be checked for contamination during maintenance work on the system.

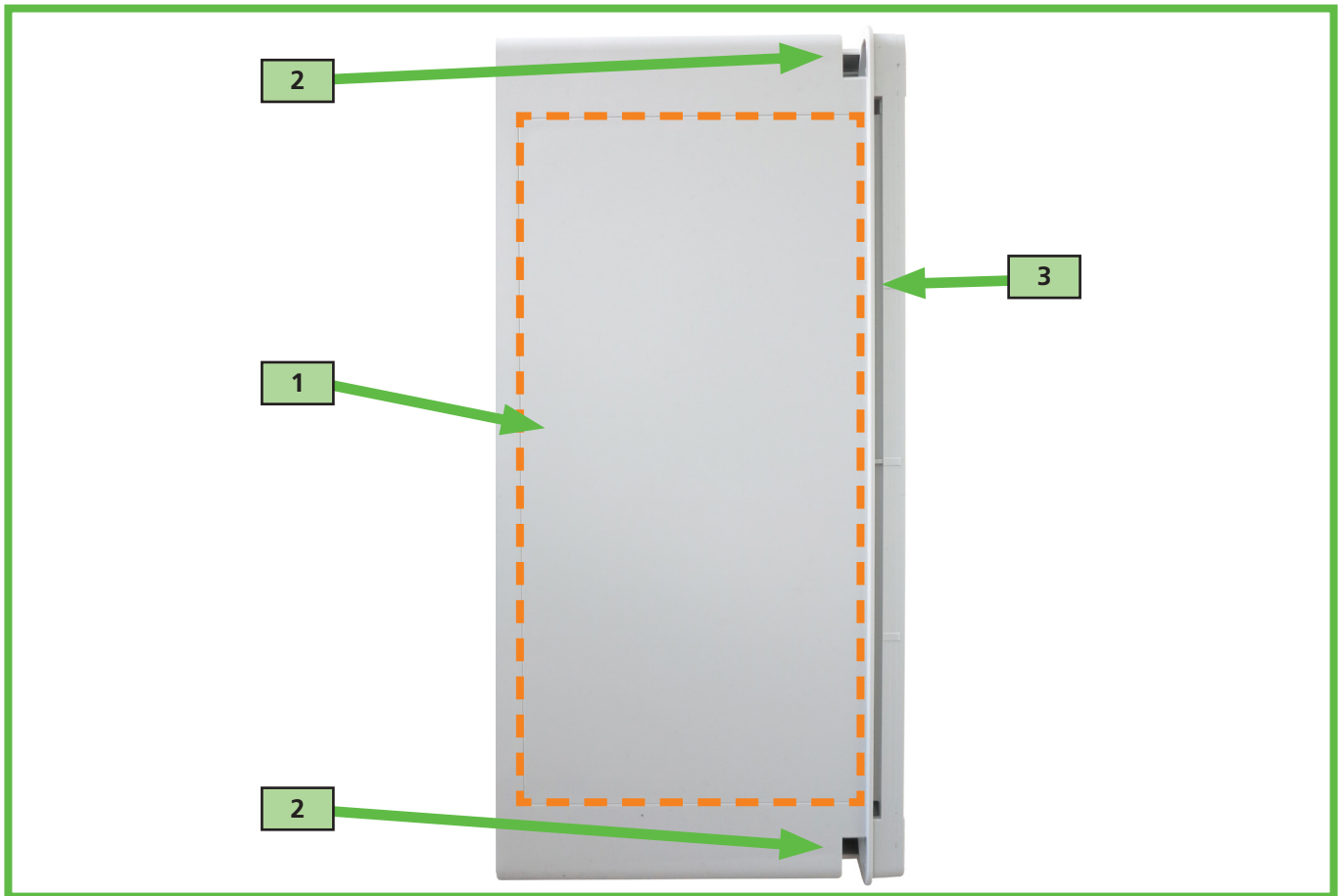


Fig. 6: Side walls

1	Area for drilled holes and cut-outs
2	Opening for threaded inserts
3	Water drainage channel

Threaded inserts

The threaded inserts in the corner areas of the boxes are adapted to the different variants of cover or frame fastening. Exchanging cover screws and threaded inserts enables the screw system to be changed, even on existing enclosure systems.

Screw points

The screw points are used to screw the cover or frame to the box using the threaded inserts. At the same time, the channels below serve as mounting points for mounting the enclosure system outside the sealing area.

The following variants for mounting the cover or frame are available, some as accessories

- Quick thread screw
- Quick closure, ¼ turn



Note

Mounting the threaded inserts

To make it easier to mount the box using the screw channels outside the sealing area, the threaded inserts should only be inserted after the box has been mounted.

Interior

The interior of the GEOS enclosure systems is used to hold the equipment.

The following are available as accessories:

- Assembly plates made of galvanised sheet steel
- Assembly plates made of insulating material
- Standard mounting rails

They can be screwed directly onto the mounting plugs on the box floor or mounted at different heights using mounting holders.

Empty enclosure

Installation weights

GEOS empty enclosures may only be fitted with components that do not exceed the following maximum installation weights:

Type marking: Depending on the type with suffix -t, followed by o or m, depending on the type with suffix /DS	Total	Cover
GEOS-L 3030-18	14 kg	3 kg
GEOS-L 3030-22	14 kg	3 kg
GEOS-L 3040-18	18 kg	4 kg
GEOS-L 3040-22	18 kg	4 kg
GEOS-L 4050-22	25 kg	5 kg

Cover

GEOS empty enclosures are available with cover variants in grey, black or transparent blue.

The cover with the overlapping, all-round edge optimally protects the seal.

The cover can be easily placed on the box without bending.

The combination of box and top part creates a creepage distance, which realises a rated insulation voltage of 1,000V AC or 1,500V DC with a degree of contamination of 3 (IEC 61439).

Cover fastening

The cover is closed with the threaded inserts in the box by means of quick closings or quick-thread screws.

Type marking

GEOS empty enclosures have a type marking in the box and cover:

Type marking: Depending on the type with suffix -t, followed by o or m, depending on the type with suffix /DS	Box Name	Cover Name
GEOS-L 3030-18	3030-18	L-3030
GEOS-L 3030-22	3030-22	L-3030
GEOS-L 3040-18	3040-18	L-3040
GEOS-L 3040-22	3040-22	L-3040
GEOS-L 4050-22	4050-22	L-4050

Sealing the cover

The cover can be secured with sealing wire if necessary.



Fig. 7: Sealing the cover

Control cabinet

Installation weights

GEOS control cabinets may only be fitted with components that do not exceed the following maximum installation weights:

Type marking: Depending on the type with suffix -t, followed by o or m, depending on the type with suffix /SH and/ or /DS	Total	Door
GEOS-S 3030-18	14 kg	3 kg
GEOS-S 3030-22	14 kg	3 kg
GEOS-S 3040-18	18 kg	4 kg
GEOS-S 4030-18	18 kg	4 kg
GEOS-S 3040-22	18 kg	4 kg
GEOS-S 4030-22	18 kg	4 kg
GEOS-S 4050-22	25 kg	5 kg
GEOS-S 5040-22	25 kg	5 kg

Frame and door



Fig. 8: Openings in the frame for cable insertion

GEOS control cabinets are available with door variants in grey, black or transparent blue.

The frame with the overlapping, all-round edge optimally protects the seal.

The frame can be easily placed on the box without bending.

There are openings in the frame that lead into the sealing area of the box.

The door with the overlapping, all-round edge optimally protects the seal.

The combination of box, frame and door creates a creepage distance, which realises a rated insulation voltage of 1,000V AC or 1,500V DC with a degree of contamination of 3 (IEC 61439).

Frame fastening

The frame is closed with the threaded inserts in the box by means of quick closings or quick-thread screws.

Type marking

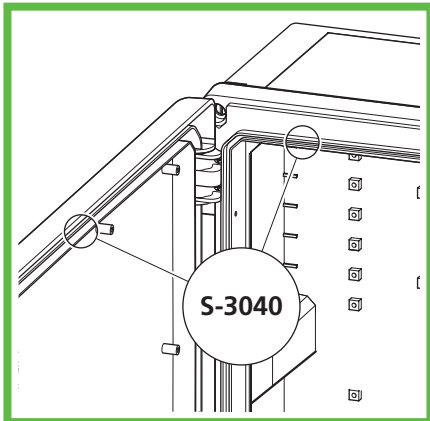


Fig. 9: Type marking

GEOS control cabinets have a type marking in the box, frame and door:

Type marking: Depending on the type with suffix -t, followed by o or m, depending on the type with suffix /SH and/or /DS	Box Name	Frame Name	Door Name
GEOS-S 3030-18	3030-18	S-3030	S-3030
GEOS-S 3030-22	3030-22	S-3030	S-3030
GEOS-S 3040-18	3040-18	S-3040	S-3040
GEOS-S 4030-18	3040-18	S-3040	S-4030
GEOS-S 3040-22	3040-22	S-3040	S-3040
GEOS-S 4030-22	3040-22	S-3040	S-4030
GEOS-S 4050-22	4050-22	S-4050	S-4050
GEOS-S 5040-22	4050-22	S-4050	S-5040

Universal accessories

The following parts and assemblies are not included in the scope of supply of GEOS enclosure systems. All universal accessories can be used for GEOS empty enclosures as well as for GEOS control cabinets.

Mounting holder

The mounting holders are used to accommodate assembly plates and standard rails at different heights. At least 4 holders are required for assembly plates, 2 holders for standard rails. It consists of a base holder and the mounting support for assembly plates and standard rails which can be inserted into it.



Fig. 10: Mounting holder for standard rails and assembly plates



Fig. 2: Universal mounting holder

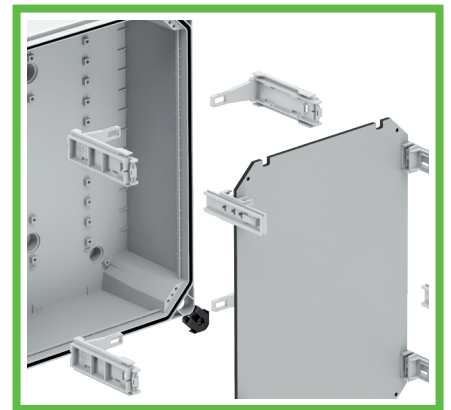


Fig. 3: Mounting system structure



Note

The GEOS-L MHH-18 and GEOS-L MHH-22 mounting holders can only be used in GEOS empty enclosures, not in GEOS control cabinets.

Standard mounting rails

The 35 x 7.5 mm and 35 x 15 mm standard rails can be screwed onto the mounting plugs of the box using the screws supplied. Alternatively, they can be mounted in the enclosure with 2 mounting holders at different heights.



Fig. 11: Standard rail

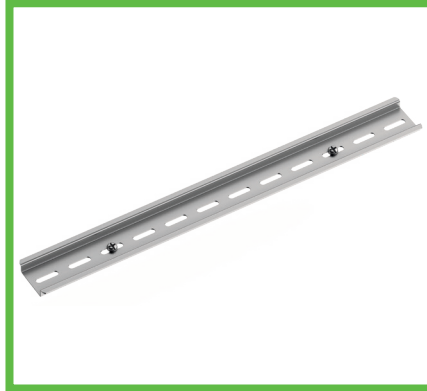


Fig. 4: Universal standard rail



Fig. 5: Standard rail installation

Enclosure side	Length of the standard rail	Maximum load
300 mm	250 mm	3 kg
400 mm	350 mm	3 kg
500 mm	450 mm	3 kg

Carrying frame

Carrying frame with 35 mm standard rails, in heights of 7.5 and 15 mm, can be mounted on the mounting plugs of the box with the enclosed retention screws. Optional installation with mounting holders at various heights possible. A shock protection cover is available separately.



Fig. 12: Carrying frame with standard rails

Name	Modules	Height	Application
GEOS TGS 3040-2	2 x 12	7.5	For mounting in GEOS-L and GEOS-S 3040
GEOS TGS 4050-3	3 x 18	7.5	For mounting in GEOS-L and GEOS-S 4050
GEOS TGS 4050-2	2 x 21	7.5	For mounting in GEOS-L 4050 and GEOS-S 5040
GEOS TGS NS35/15 3040-2	2 x 12	15	For mounting in GEOS-L and GEOS-S 3040
GEOS TGS NS35/15 4050-3	3 x 18	15	For mounting in GEOS-L and GEOS-S 4050
GEOS TGS NS35/15 4050-2	2 x 21	15	For mounting in GEOS-L 4050 and GEOS-S 5040

Mounting plates

Assembly plates are available in dimensions matched to the enclosure sizes in the following materials:

- Galvanised sheet steel (2 mm thick)
- Insulating material (5 mm thick)

The assembly plate is intended for the individual assembly of equipment.

It is bolted on the mounting plugs of the box with the screws supplied (tightening torque: 2 Nm). Alternatively, it can be fastened in several positions in the box using the mounting holders available as accessories.

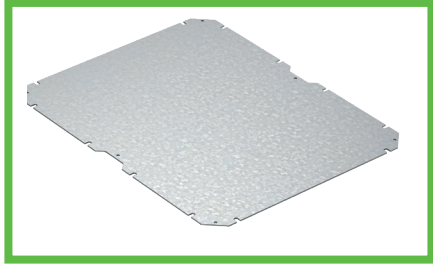


Fig. 13: Assembly plate steel plate

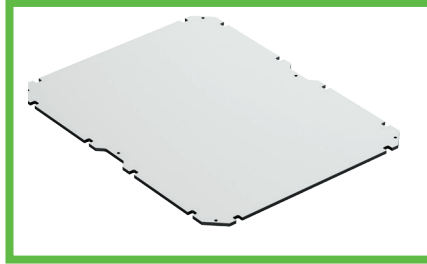


Fig. 6: Assembly plate insulating material

Maximum load on assembly plates:

Name	Material	Maximum load
GEOS MPS 3030	Galv. sheet steel 2 mm	7 kg
GEOS MPS 4030	Galv. sheet steel 2 mm	10 kg
GEOS MPS 4050	Galv. sheet steel 2 mm	12 kg
GEOS MPI 3030	Insulating material 5 mm	7 kg
GEOS MPI 4030	Insulating material 5 mm	10 kg
GEOS MPI 4050	Insulating material 5 mm	12 kg

External fixing lugs

The plastic or stainless steel external fixing lugs can be attached to the back of the box in various positions.



Fig. 14: GEOS ABL-10 external fixing lug



Fig. 7: GEOS ABL-40 external fixing lug

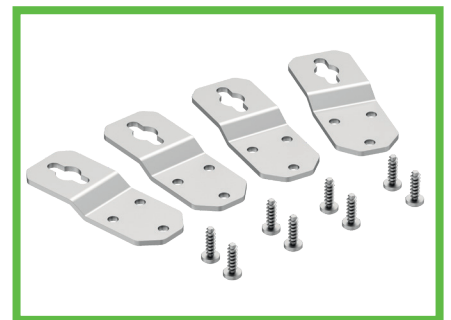


Fig. 8: GEOS ABL-10/ES external fixing lug

Name	Wall spacing	Material
GEOS ABL-10	10 mm	Plastic
GEOS ABL-40	40 mm	Plastic
GEOS ABL-10/ES	10 mm	Stainless steel V4A
GEOS ABL-40/ES	40 mm	Stainless steel V4A

Mast clamp set

The galvanised steel mast clamp set can be attached to the back of the box.

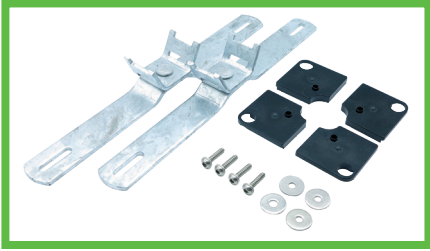


Fig. 15: Mast clamp set

Name	Enclosure side	Application
GEOS MSS-30	300 mm	Mounting on the 300 mm enclosure side
GEOS MSS-40	300 mm	Mounting on the 400 mm enclosure side
GEOS MSS-50	400 mm	Mounting on the 500 mm enclosure side

Screw clamp set

The stainless steel V2A screw clamp set is used in conjunction with the GEOS MSS mast clamp set.



Fig. 16: Screw clamp set

Name	Application
SRS 60-90	for mast diameters from 60 to 90 mm
SRS 90-150	for mast diameters from 90 to 150 mm
SRS 150-210	for mast diameters from 150 to 210 mm

Design plate

The design plate made of V2A stainless steel serves as an optional rear cover for GEOS enclosure systems when using the GEOS MSS mast clamp set.



Fig. 17: Design plate

Name	Description	Dimensions
GEOS DP-3030	Rear cover for GEOS 3030 enclosure systems	293 x 293 x 2 mm
GEOS DP-3040	Rear cover for GEOS 3040 enclosure systems	293 x 393 x 2 mm
GEOS DP-4050	Rear cover for GEOS 4050 enclosure systems	393 x 493 x 2 mm

BEL AIR M40 ventilation element set

If non air-tight enclosure systems are used in environments with a fluctuating temperature and air humidity, condensation problems can occur.

The physical basis for this is that air at a certain temperature and a certain pressure can only absorb a very specific maximum amount of water vapour.

The higher the temperature and air pressure, the greater the maximum possible water content. In comparison to a temperature of 55 °C, air at a temperature of 20°C can only absorb 20% of the water content. Depending on the power losses given off by the installed devices, the air inside the enclosure system commonly heats up to temperatures of up to 55°C. If suitable installed devices and cables are used then this temperature can be even higher.

The warm air in the enclosure system absorbs the water vapour contained in the ambient air over time. If the outside temperature drops then the outer walls of the enclosure system cool down. Upon reaching the dew point temperature, the water vapour contained within the air deposits on the inside of the enclosure system as condensate. The water collects inside the box and can cause damage here.

The BEL Air M40 ventilation element set available as an accessory can be mounted on the back or in the side walls. The air ventilation element facilitates the avoidance of condensate water whilst maintaining the high IP protection rating of IP65. Furthermore, it also supports the transportation of any condensate out of the enclosure system in the shortest possible time by exchanging air. The continuous rate of air exchange allows the interior air to mix constantly with the environmental air and transport the moisture outwards this way. Air exchange also takes place in environments with almost constant humidity and temperature because the internal temperature increases due to the built-in components. The ventilation element is maintenance-free by design. It is equipped with an exchangeable filter element. The filter element retains particles which are 10 µm or larger. The filter is exchangeable.



Fig. 18: BEL AIR M40

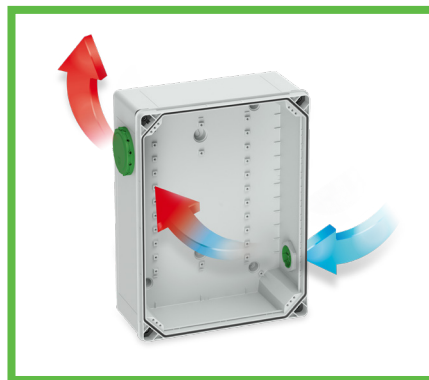


Fig. 9: Installation example



Note

IK and IP protection ratings

If changes, such as the installation of ventilation elements, cable insertions, command and message devices on GEOS enclosure systems are implemented, then the IK and IP protection ratings of the entire system must be reassessed.

Empty enclosure accessories

Installation board cover plate

The installation board cover plate made of insulating material (4mm thick) can be mounted in the upper part of the box and is suitable for the installation of command signalling devices, measuring instruments or similar equipment. It can also be used as a cover plate to protect against accidental contact with the installed equipment.

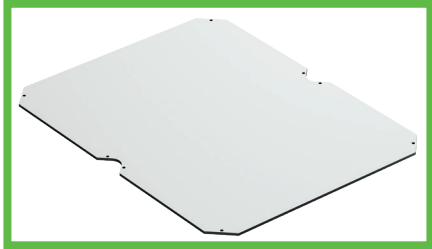


Fig. 19: Installation board/cover plate

Maximum load on box installation boards:

Name	Material	Maximum load
GEOS-L EP-3030	Insulating material 4 mm	3 kg
GEOS-L EP-4030	Insulating material 4 mm	4 kg
GEOS-L EP-4050	Insulating material 4 mm	5 kg

Maximum load on cover installation boards:

Name	Material	Maximum load
GEOS-L EPD-3030	Insulating material 4 mm	3 kg
GEOS-L EPD-4030	Insulating material 4 mm	4 kg
GEOS-L EPD-4050	Insulating material 4 mm	5 kg

Partition wall:

The partition wall can be used to divide the interior either lengthwise or across.

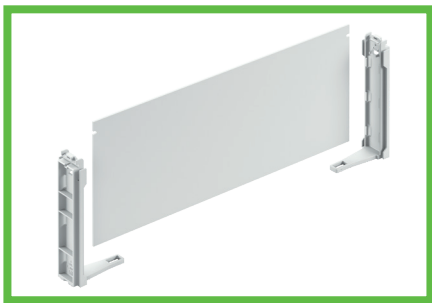


Fig. 20: Partition wall and holders

Name	Enclosure side	Enclosure height
GEOS-L TW 30-18	300 mm	180 mm
GEOS-L TW 30-22	300 mm	226 mm
GEOS-L TW 40-18	400 mm	180 mm
GEOS-L TW 40-22	400 mm	226 mm
GEOS-L TW 50-22	500 mm	226 mm

Shock protection cover

The shock protection for rail mounted devices can be used as an option with the carrying frames as a cover. Suitable for mounting in GEOS-L empty enclosures.

Retention screws are included in the scope of supply.

Height of the shock protection cover: 2 mm.



Fig. 21: Shock protection cover for rail mounted devices

Name	Modules	Application
GEOS-L BSA 3030-1	1 x 12	For mounting in GEOS-L 3030
GEOS-L BSA 3040-2	2 x 12	For mounting in GEOS-L 3040
GEOS-L BSA 3040-1	1 x 18	For mounting in GEOS-L 3040
GEOS-L BSA 4050-3	3 x 18	For mounting in GEOS-L 4050
GEOS-L BSA 4050-2	2 x 21	For mounting in GEOS-L 4050

Cover retainer

Cover retainer made of stainless steel with retention screws, mountable retroactively.

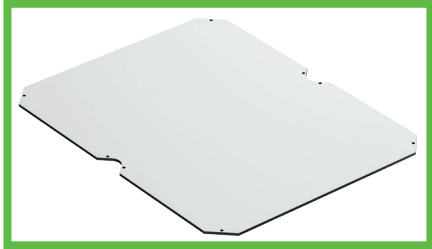


Fig. 22: Cover retainer

Control cabinet accessories

Installation board cover plate

The installation board cover plate made of insulating material (4mm thick) can be mounted in the control cabinet frame and is suitable for the installation of command signalling devices, measuring instruments or similar equipment. It can also be used as a cover plate to protect against accidental contact with the installed equipment.



**Fig. 23: Installation board/
cover plate**

Maximum load on frame installation boards:

Name	Material	Maximum load
GEOS-S EPR 3030	Insulating material 4 mm	3 kg
GEOS-S EPR 3040/4030	Insulating material 4 mm	4 kg
GEOS-S EPR 4050/5040	Insulating material 4 mm	5 kg
GEOS-S EPR-t 3030	Transparent polycarbonate 4 mm	3 kg
GEOS-S EPR-t 3040/4030	Transparent polycarbonate 4 mm	4 kg
GEOS-S EPR-t 4050/5040	Transparent polycarbonate 4 mm	5 kg

Maximum load on door installation boards:

Name	Material	Maximum load
GEOS-S EPT 3030	Insulating material 4 mm	3 kg
GEOS-S EPT 3040	Insulating material 4 mm	4 kg
GEOS-S EPT 4030	Insulating material 4 mm	4 kg
GEOS-S EPT 4050	Insulating material 4 mm	5 kg
GEOS-S EPT 5040	Insulating material 4 mm	5 kg

Shock protection cover

The shock protection for rail mounted devices can be used as an option in the frame as a cover. Suitable for tool-free mounting in GEOS-S control cabinets.



Fig. 24: Shock protection cover for rail mounted devices

Name	Modules	Application
GEOS-S BSM 3030-9	1 x 9	For mounting in GEOS-S 3030
GEOS-S BSM 3030	–	For mounting in GEOS-S 3030
GEOS-S BSM 3040-9	1 x 9	For mounting in GEOS-S 3040
GEOS-S BSM 3040	–	For mounting in GEOS-S 3040
GEOS-S BSM 4050-15	1 x 15	For mounting in GEOS-S 4050
GEOS-S BSM 4050-15/MIT	1 x 15	For mounting in GEOS-S 4050
GEOS-S BSM 4050	–	For mounting in GEOS-S 4050
GEOS-S BSM 3040-9/2	2 x 9	For mounting in GEOS-S 3040
GEOS-S BSM 4050-15/3	3 x 15	For mounting in GEOS-S 4050

Interior door

The interior door made of insulating material (4mm thick) can be mounted in the control cabinet frame and is suitable for the installation of command signalling devices, measuring instruments or similar equipment. Suitable for mounting in GEOS-S control cabinets.

Retention screws are included in the scope of supply.

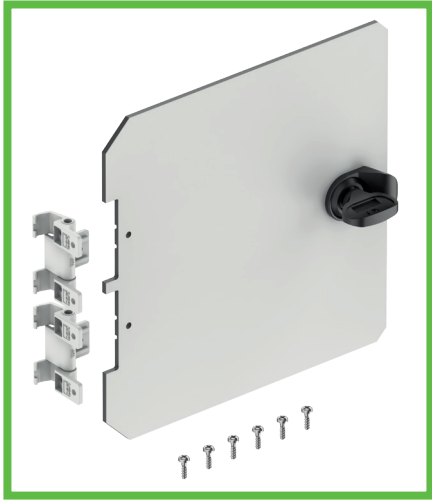


Fig. 25: Interior door with fastening material

Name	Application
GEOS-S IT 3030	For mounting in GEOS-S 3030
GEOS-S IT 3040	For mounting in GEOS-S 3040
GEOS-S IT 4030	For mounting in GEOS-S 4030
GEOS-S IT 4050	For mounting in GEOS-S 4050
GEOS-S IT 5040	For mounting in GEOS-S 5040

Partition wall

The partition wall can be used to divide the interior either lengthwise or across.

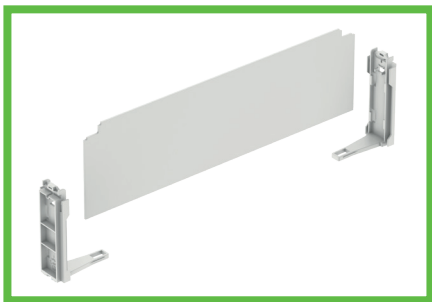


Fig. 26: Partition wall and holders

Name	Enclosure side	Enclosure height
GEOS-S TW 30-18	300 mm	180 mm
GEOS-S TW 30-22	300 mm	226 mm
GEOS-S TW 40-18	400 mm	180 mm
GEOS-S TW 40-22	400 mm	226 mm
GEOS-S TW 50-22	500 mm	226 mm

Door arrester set

The door opener can be used to fix the control cabinet door in one of two possible positions.

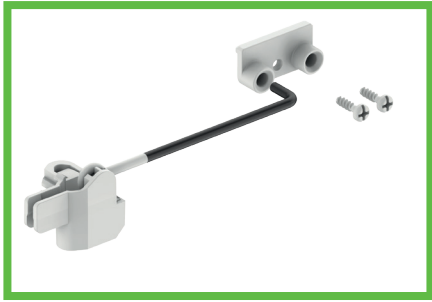


Fig. 27: Door arrester

Twist lock set

Twist lock set for installation in GEOS-S control cabinets.

The set contains 2 turning bolts and, depending on the model, a key.



Fig. 28: Twist lock

Name	Design
GEOS-S DRS-DB/3	Double-bit 3 mm mandrel
GEOS-S DRS-DB/5	Double-bit 5 mm mandrel
GEOS-S DRS-VK/8	Square 8 mm
GEOS-S DRS-DK/8	Triangle 8 mm
GEOS-S DRS-KB	Toggle handle
GEOS-S DRS-SZ	Countersunk slot

Lock fittings

Profile half cylinder for GEOS-S control cabinets with swivel lever.

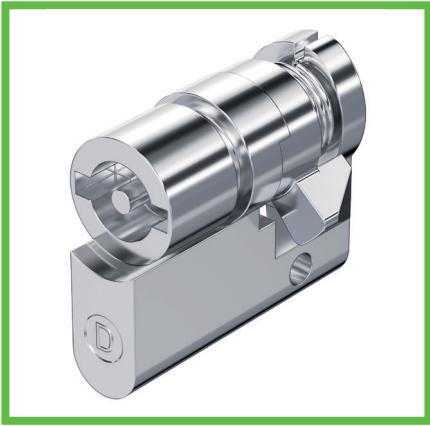


Fig. 29: Lock fittings

Name	Design
GEOS-S SGA-2	in accordance with DIN 18252, 8 x 45° adjustable, with three keys, different locking
GEOS-S SGA-DB/3	Double-bit 3 mm mandrel

Mounting

The GEOS enclosure system must be installed using suitable fastening material.

The requisite fastening materials must be selected based on the mounting surface.

In the event of wall unevenness of more than 2 mm it is necessary to level the area beneath the mounting points, in order to avoid warping the GEOS enclosure system.

Operating position

The GEOS enclosure systems are designed for vertical and horizontal wall mounting, as well as horizontal floor mounting. Ceiling mounting is only permitted with tightly screwed assembly plate or standard rail.



Danger

Ceiling mounting operating position

With this assembly type, parts may fall out after opening the cover or frame.

- ▶ The use of mounting holders for ceiling mounting is not permitted.



Note

Operating position of equipment

The permissible operating position of the equipment and its attachment in the enclosure system must be complied with.

Mounting the box

Required fastening material: Screws, dowels, etc.

The box of the GEOS enclosure system can be mounted in four different ways:

- 4-point mounting inside the sealing area.
- 3-point keyhole mounting inside the sealing area.
- Mounting with external fixing lugs.

- Mounting outside the sealing area below the cover screws.

The exact mounting dimensions can be taken from the dimension sheets. (from Seite 70)



Note

Rated voltage

Use of the mounting points inside the sealing area is suitable for electrical systems with a rated voltage up to max. 690V AC/DC.

Use of the mounting points outside the sealing area or the external fixing lugs is suitable for electrical systems with a rated voltage up to 1000V AC/1500V DC.



Note

Instruction per UL 50/CSA 22.2 File:

Use fastening holes located under the retention screws for the cover, which are external to the equipment cavity.

Work preparation

The side walls of GEOS enclosure systems have no knockouts for cable insertions.

Appropriate drilled or milled holes should be drilled or milled prior to mounting the box.

Cable insertions

The GEOS enclosure systems are not supplied with accessories for cable insertion. Various types of cable insertions are available as accessories. Overview of the sealing possibilities for cable insertions and the associated sealing areas from the Spelsberg accessories:

	Cable gland KVR, IP68		Double membrane seals DMS, IP66	Stepped nipple SNI, IP55	Attachment bushes AST, IP54
Size	Sealing area	Rated torque	Sealing area	Sealing area	Sealing area
M12	2 - 6.5 mm	2 Nm	---	---	---
M16	4 - 10 mm	2.5 Nm	5 - 9 mm	---	6 - 10 mm
M20	6 - 12 mm	4 Nm	7 - 12 mm	5 - 16 mm	8 - 13.5 mm
M20 GDB	7 - 14 mm	4 Nm	---	---	---
M25	9 - 16 mm	6 Nm	9 - 16 mm	5 - 21 mm	9 - 18.5 mm
M32	11 - 21 mm	7 Nm	14 - 21 mm	13 - 26.5 mm	13 - 23 mm
M40	16 - 28 mm	7.5 Nm	19 - 28 mm	13 - 24 mm	17 - 30 mm
M50	21 - 34.5 mm	8 Nm	---	---	---
M63	30 - 44.5 mm	9 Nm	---	---	---



Note

IP protection rating

Depending on the cable insertions used, the IP protection rating of the GEOS enclosure system will be reduced to the IP protection rating of the cable insertion.



Note

IP protection rating

Depending on the cable insertions used, it is possible that the IK protection rating of the GEOS enclosure system will reduce.

Knockouts

The GEOS enclosure systems only have combination knockouts on the rear side in the nominal sizes M40/M32.



Note

Box floor

If using the knockouts in the box floor, these must be knocked out before mounting.

When using double membrane seals, then no additional spacers are required for wall mounting to seal the cable insertions.

Required tool: Hammer, flat-blade screwdriver

- ▶ Position the screwdriver at the marking edge, at an angle of 60 – 75° and pointing towards the middle point.
- ▶ Hammer out the knockout.
- ▶ Avoid damaging the sealing contour.

Cable insertion

- ▶ Insert the desired cable insertion.



Note

Instruction per UL 50/CSA 22.2 File:

Instructions for installation

- ▶ Use suitable UL Listed devices having an environmental rating equal to or better than the enclosure rating to close all unfilled openings.
 - Type rating for the devices 4X and 12K or better.
 - Suitable for use with 2 1/2 in or smaller conduits in enclosures XXXX-18 and 3 in or smaller conduits in enclosures XXXX-22.
 - When used as a pull box, installation shall be in accordance with Section 370-28 of Mexico's Electrical Installations, NOM-001-SEDE, and Section 314.28 of the National Electrical Code, ANSI/NFPA 70.

Caution: Enclosures do not provide earthing means between conduit connections. Use of earthing hubs and jumper wires is required. Refer to packaging sheet for instructions, types and sizes. The Myers Electric company earth hub cat. no. STG or STAG followed by 1, 2, 3, 4, or 5 are suitable for use with the above stated enclosures.

Earthing wire sized AWG 10 shall be used except for size ST(A)G5 shall be AWG 8.

Drainage openings

The GEOS enclosure systems have drainage openings on all sides of the box floor.

The drainage openings can be knocked out if necessary before or after mounting.



Note

IP protection rating

Opening the drainage openings reduces the protection rating of the enclosure system to IP23D when mounted on a surface with a 20 mm overlap.

If necessary, all bottom drainage openings must be opened during wall installation.

If the operating position is horizontal, all drainage openings must be opened if necessary.

The drainage openings must not be opened for ceiling mounting.

Required tool: Hammer, flat-blade screwdriver, max. blade width 5.5 mm

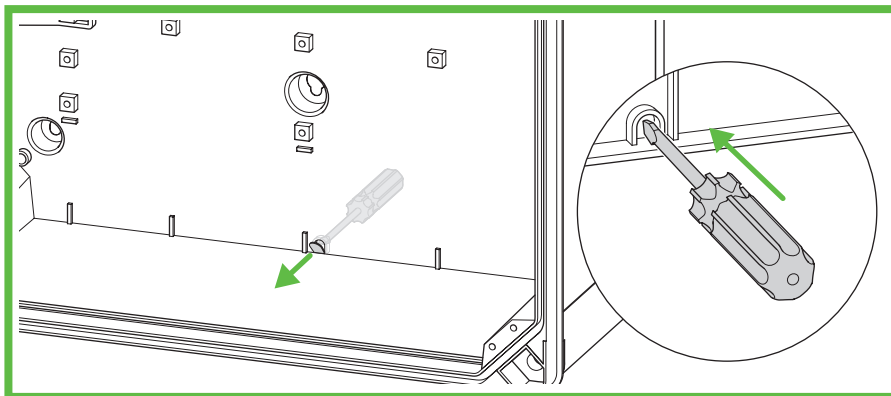


Fig. 30: Drainage opening

- ▶ Place the screwdriver outside the box on the knockout of the drainage opening.
- ▶ Hammer out the knockout.

4-point mounting inside the sealing area

The box is mounted using the four elongated holes.

Suitable fastening material:

- Elongated holes: Screws up to a maximum M6 or screws with a diameter of 5.5 mm. The screw head is permitted to have a max. diameter of 12 mm.

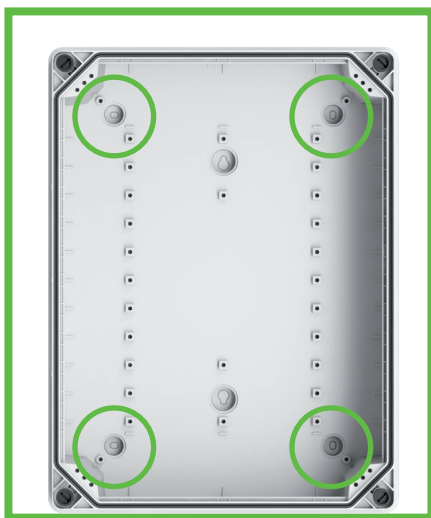


Fig. 31: Fastening points, 4-point mounting

Required tool: Hammer, screwdriver

- ▶ Knock out the fastening holes.
- ▶ Align the box.
- ▶ Mark the fastening points.
- ▶ Drill the holes if necessary and insert suitable dowels.

- ▶ Screw the screws into the elongated holes.
- ▶ Close all fastening holes with the sealing plugs.
- ✓ The mounting process is complete.

3-point keyhole mounting inside the sealing area

The box is mounted via the top keyhole and the two bottom elongated holes.

Suitable fastening material:

- Elongated holes: Screws up to a maximum M6 or screws with a diameter of 5.5 mm. The screw head is permitted to have a max. diameter of 12 mm.
- Keyhole: Screws up to a maximum M5 or screws with a diameter of 5 mm. In order to use the keyhole, the screw head is permitted to have a max. diameter of 10 mm.

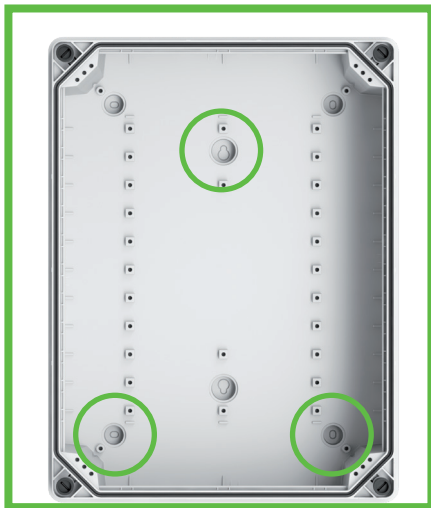


Fig. 32: Fastening points, 3-point mounting



Fig. 10: Keyhole mounting

Required tool: Hammer, screwdriver.

- ▶ Knock out the fastening holes.
- ▶ If necessary, drill the hole for mounting the keyhole and insert a suitable dowel.
- ▶ Screw in the top screw at the desired position.
- ▶ Hang the box with the keyhole on the pre-mounted top screw.
- ▶ Align the box.
- ▶ Mark the bottom fastening points.
- ▶ Drill the holes if necessary and insert suitable dowels.
- ▶ Screw the screws into the bottom elongated holes.
- ▶ Close all fastening holes with the sealing plugs.
- ✓ The mounting process is complete.

Mounting with external fixing lugs



Note

External fixing lugs

The external fixing lugs are **not** included in the scope of supply.

The box is mounted using the external fixing lugs, which are attached to the box with the stainless steel screws supplied. The external fixing lugs can be mounted vertically or diagonally.

Suitable fastening material:

- Screws up to a maximum M6
- Screws with a diameter of 5.5 mm. The screw head is permitted to have a max. diameter of 12 mm.

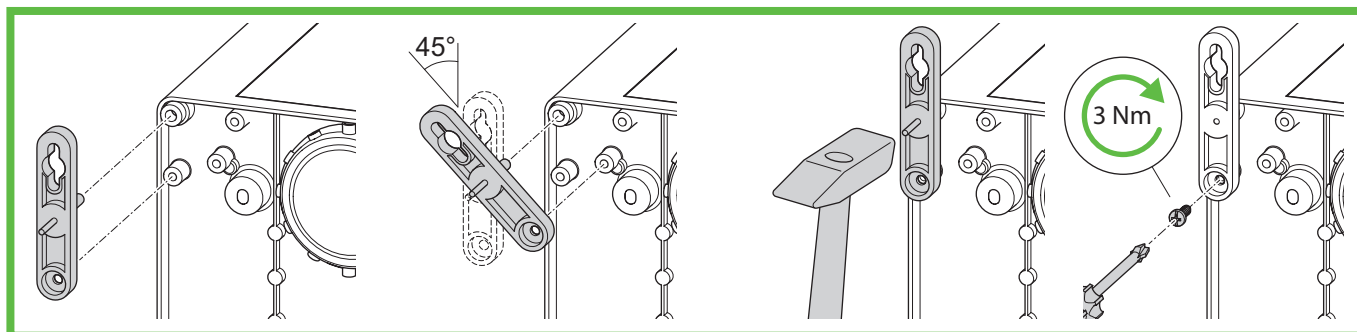


Fig. 33: Mounting with external fixing lug ABL-10

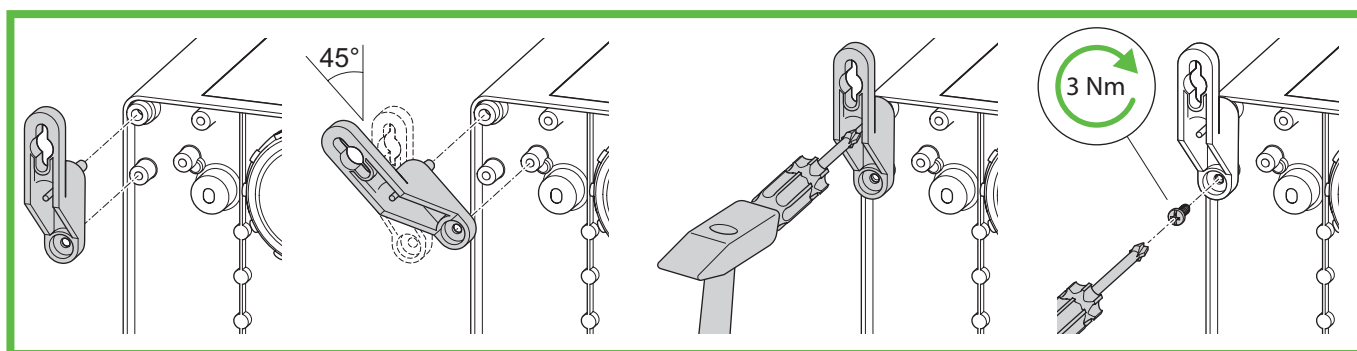


Fig. 34: Mounting with external fixing lug ABL-40

Required tool: Hammer, screwdriver (PZ2)

- ▶ Position the external fixing lug in the desired orientation and press the expansion element into the screw plug.
- ▶ Hammer in the impact pin with a hammer. With the ABL-40 a screwdriver is used as an aid.
- ▶ Fix the external fixing lugs in the mounting plug with the stainless steel screw provided.
- ▶ Align the box.

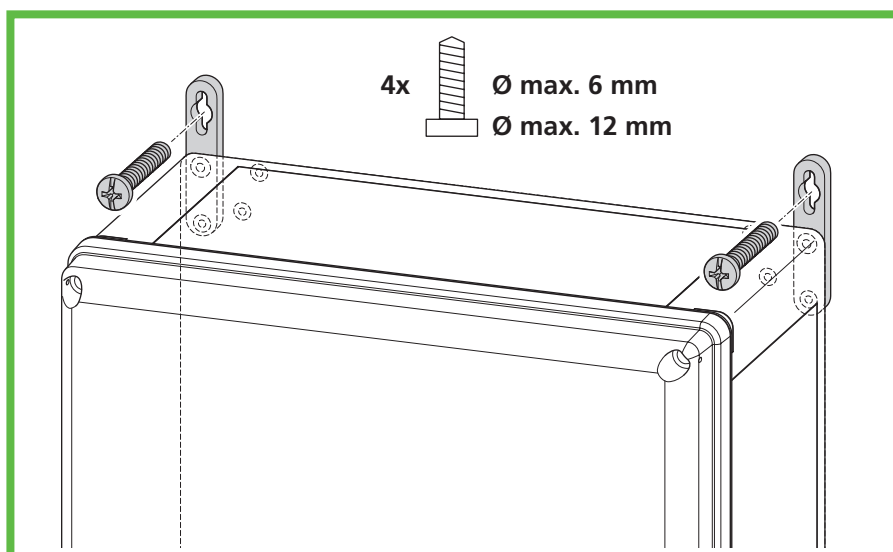


Fig. 35: Wall mounting

- ▶ Screw the box to the desired position using the external fixing lugs.
- ✓ The mounting process is complete.

Mounting with stainless steel external fixing lugs



Note

External fixing lugs

The external fixing lugs are **not** included in the scope of supply.

The box is mounted using the external fixing lugs, which are attached to the box with the stainless steel screws supplied. The external fixing lugs can be mounted vertically or horizontally.

Suitable fastening material:

- Screws up to a maximum M6
- Screws with a diameter of 5.5 mm. The screw head is permitted to have a max. diameter of 12 mm.

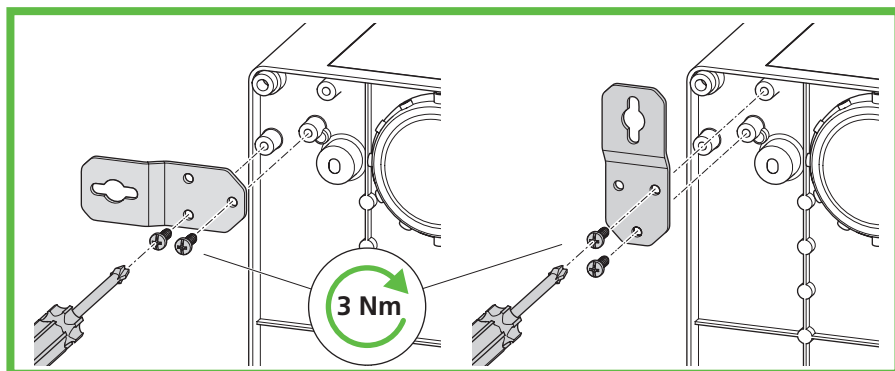


Fig. 36: Mounting with external fixing lug ABL-10/ES

Required tool: Screwdriver (PZ2)

- ▶ Position the external fixing lug in the desired orientation.
- ▶ Fix the external fixing lugs with the stainless steel screws provided.
- ▶ Align the box.

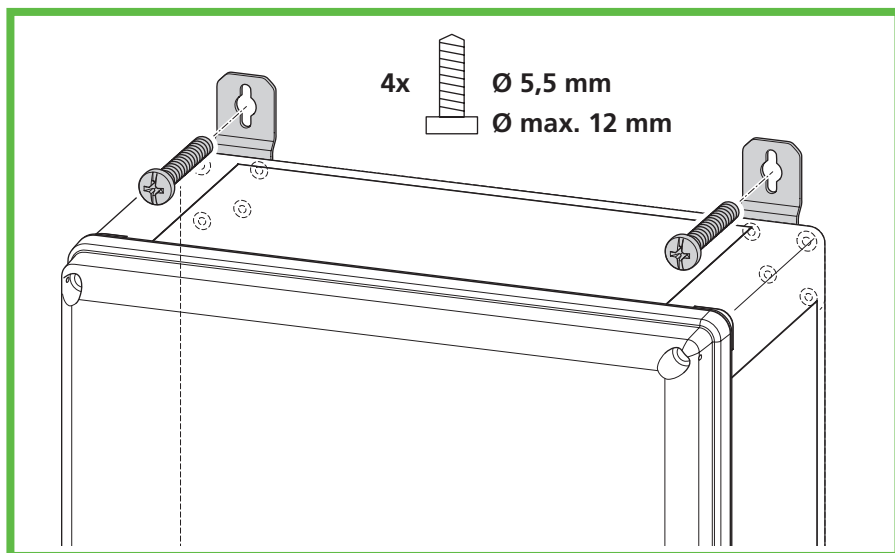


Fig. 37: Wall mounting

- ▶ Screw the box to the desired position using the external fixing lugs.
- ✓ The mounting process is complete.

Mounting above the screw channels outside the sealing area

The box is mounted outside the sealing area using the screw channels on the corners.

Mounting outside the sealing area is suitable with level surfaces or mounting profiles (e.g. Z-profiles). The advantage of pre-wired systems is that no fastening work has to be carried out in the interior.



Note

Mounting of larger enclosure systems

There are no fastening options below the screw channels in the middle of the side walls.

Suitable fastening material:

- Screws up to a maximum M6
- Screws with a maximum diameter of 5.5 mm. The screw head must have a diameter range from 8.5 mm to 10.5 mm.

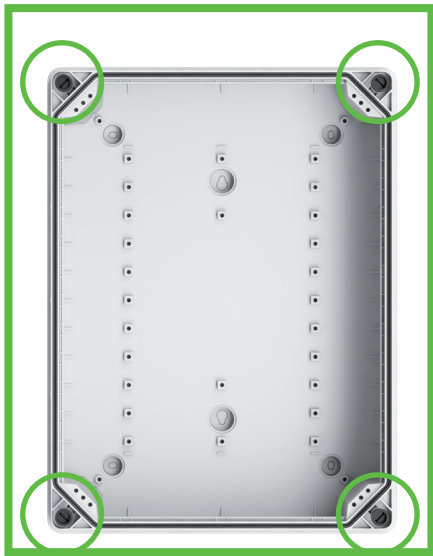


Fig. 38: Mounting outside the sealing area

Required tool: Hammer, screwdriver

(Min. blade length 130 mm for GEOS xxxx-18 enclosure systems)

(Min. blade length 175 mm for GEOS xxxx-22 enclosure systems)



Note

Threaded inserts

If the threaded inserts are already fitted, remove them before mounting.

- ▶ Align the box.
- ▶ Mark the fastening points.
- ▶ Drill the holes if necessary and insert suitable dowels.
- ▶ Screw in the screws through the bottom screw channels.
- ✓ The mounting process is complete.

Threaded inserts

Mounting the threaded inserts



Note

Threaded inserts

If the screw channels outside the sealing area are used for mounting the box, the threaded inserts should only be fitted after the box has been mounted.

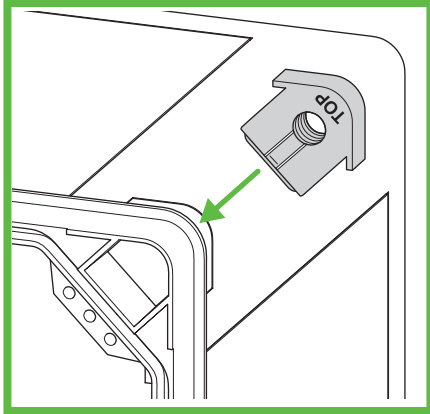


Fig. 39: Mounting of the threaded inserts GEOS 3030, GEOS 3040 GEOS 4050

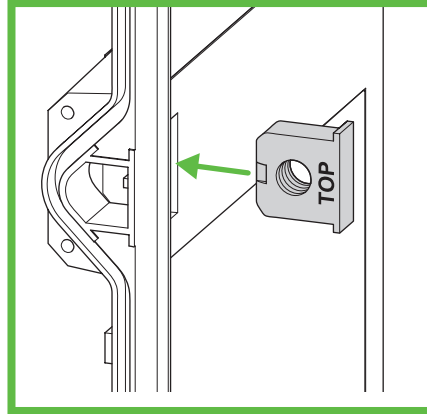


Fig. 11: Mounting of the threaded inserts GEOS 4050

- ▶ Place the threaded inserts in the cut-out on the box so that the inscription "TOP" is legible.
- ▶ Press the threaded inserts into the box until they engage. The threaded inserts must be flush with the box.
- ▶ Repeat these steps on all four corners and, if necessary, also on the side walls of larger enclosure systems
- ✓ The mounting process is complete.

Removing the threaded inserts

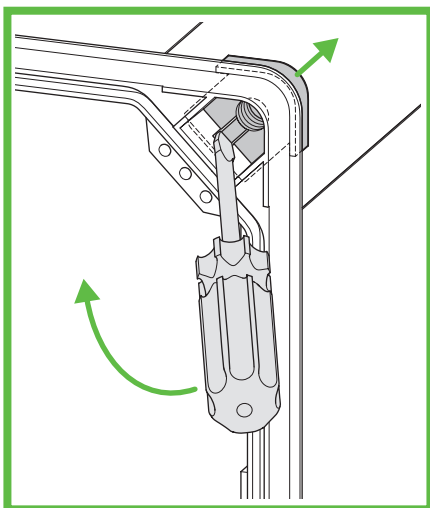


Fig. 40: Removing the threaded inserts GEOS 3030, GEOS 3040 GEOS 4050

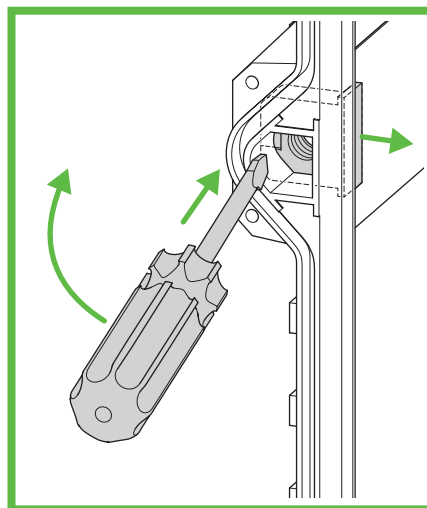


Fig. 12: Removing the threaded inserts GEOS 4050

Required tool: Screwdriver

- ▶ Insert the screwdriver at a slight angle into the opening next to the screw thread.
- ▶ Push the screwdriver towards the middle of the box and lever out the threaded insert.
- ▶ Repeat these steps on all four corners and, if necessary, also on the side walls of larger enclosure systems.
- ✓ The dismantling process is complete.

Mounting the cover



Note

If the ambient temperature drops considerably after the cover has been mounted, it is possible that the cover may get stuck on the box. Due to the high protection rating of GEOS enclosure systems, the negative pressure inside the enclosure system is not compensated. This can make it difficult to remove the cover after loosening the cover fasteners. The properties of the enclosure system are not changed in the process.

Quick thread screw

Required tool: Screwdriver



Note

Tool

Opening and closing the cover should take place using a flat-blade screwdriver (blade width 4 – 6.5 mm). To ensure tightness, a torque of 1.2 Nm must be maintained during closing.

Closing

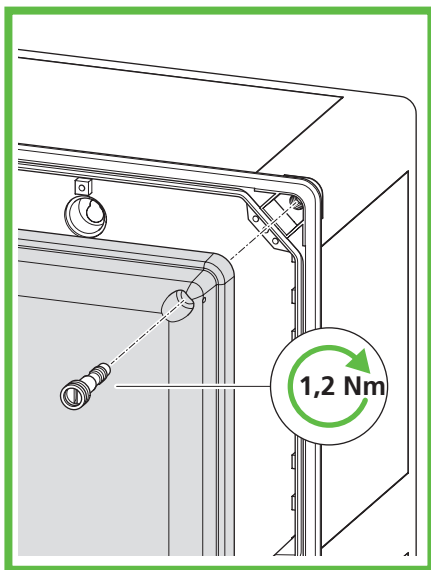


Fig. 41: Mounting of the quick-thread screw

- ▶ Check that the threaded inserts for the quick-thread screws are installed.
- ▶ Insert the screws supplied in the accessories into the cover.
- ▶ Set the cover on the box.
- ▶ Screw the cover tight with the cover screws.
- ✓ The mounting process is complete.

Opening

- ▶ Loosen the screws.
- ▶ Take the cover off of the box.
- ✓ The opening process is complete.

Quick closure

Required tool: Screwdriver



Note

Tool

Opening and closing the cover should take place using a flat-blade screwdriver (blade width 4 – 6 mm).

Closing

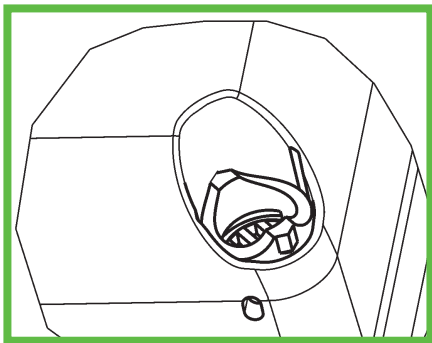


Fig. 42: Insertion of quick closure

- ▶ Check that the threaded inserts for the quick closures are installed.
- ▶ Insert the quick closures into the cover. Pay attention to the alignment of the quick closures.
- ▶ Set the cover on the box.
- ▶ Turn the quick closure slightly until the two lugs on the screw point diagonally from the corner towards the middle of the box. In this position the screw engages in the thread insert.

Engaging the quick closure

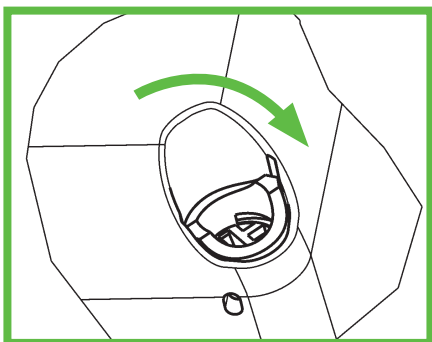


Fig. 43: Engaging the quick closure

- ▶ Next, turn the quick closure a $\frac{1}{4}$ turn to the right to lock it.
- ▶ Both lugs on the head of the quick closure and also the other screw contour now form a harmonious unit with the cover contour.

- ▶ Repeat these steps for all other quick closures.
- ✓ The mounting process is complete.

Opening

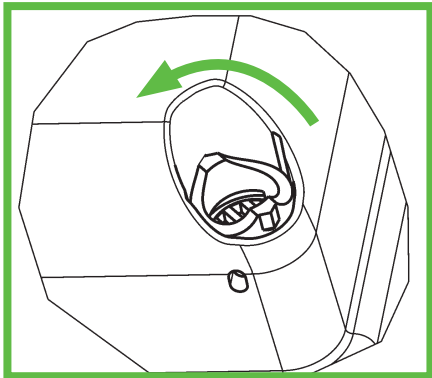


Fig. 44: Opening the quick closure

- ▶ Turn the quick closure a ¼ turn to the left until the two lugs on the head of the quick closure point diagonally from the corner towards the middle of the box. The quick closure is now unlocked.
- ▶ Repeat these steps for all other quick closures.
- ▶ Take the cover off of the box.
- ✓ The opening process is complete.

Mounting the frame



Note

If the ambient temperature drops considerably after the frame has been mounted, it is possible that the frame will be stuck on the box with the door. Due to the high protection rating of GEOS enclosure systems, the negative pressure inside the enclosure system is not compensated. This can make it difficult to open the door after the cover closures have been released. The properties of the enclosure system are not changed in the process.

Quick thread screw

Required tool: Screwdriver



Note

Tool

Opening and closing the frame should take place using a flat-blade screwdriver (blade width 4 – 6.5 mm). To ensure tightness, a torque of 1.2 Nm must be maintained during closing.

Closing

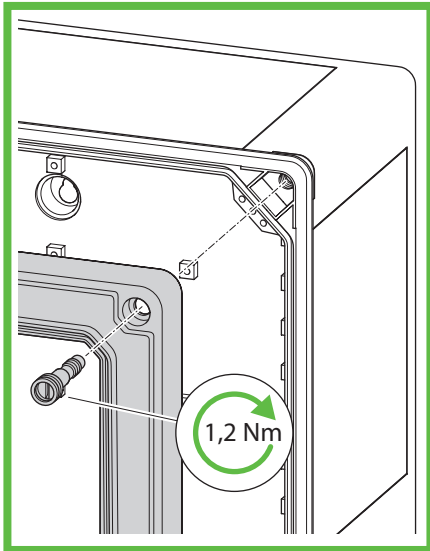


Fig. 45: Mounting of the quick-thread screw

- ▶ Check that the threaded inserts for the quick-thread screws are installed.
- ▶ Insert the screws supplied in the accessories into the frame.
- ▶ Set the frame on the box.
- ▶ Screw the frame tight with the cover screws.
- ✓ The mounting process is complete.

Opening

- ▶ Loosen the screws.
- ▶ Take the frame off of the box.
- ✓ The opening process is complete.

Quick closure

Required tool: Screwdriver



Note

Tool

Opening and closing the frame should take place using a flat-blade screwdriver (blade width 4 – 6 mm).

Closing

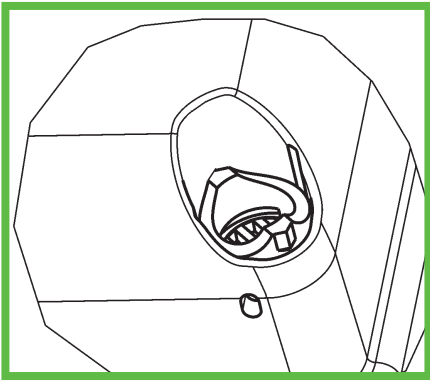


Fig. 46: Insertion of quick closure

- ▶ Check that the threaded inserts for the quick closures are installed.
- ▶ Insert the quick closures into the frame. Pay attention to the alignment of the quick closures.
- ▶ Set the frame on the box.
- ▶ Turn the quick closure slightly until the two lugs on the screw point diagonally from the corner towards the middle of the box. In this position the screw engages in the thread insert.

Engaging the quick closure

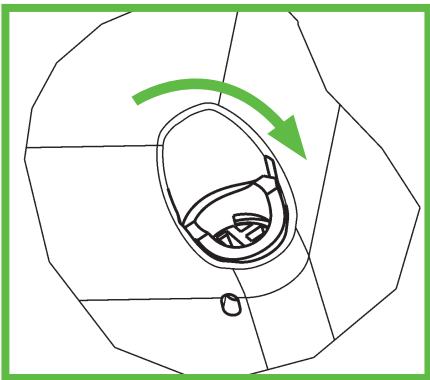


Fig. 47: Engaging the quick closure

- ▶ Next, turn the quick closure a $\frac{1}{4}$ turn to the right to lock it.
- ▶ Both lugs on the head of the quick closure and also the other screw contour now form a harmonious unit with the frame contour.
- ▶ Repeat these steps for all other quick closures.
- ✓ The mounting process is complete.

Opening

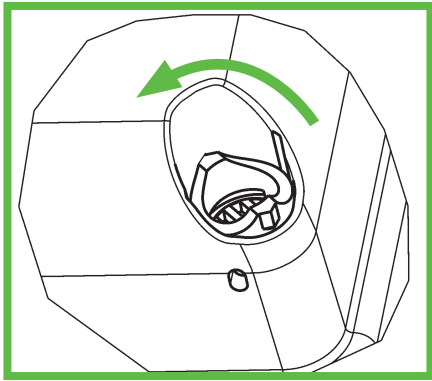


Fig. 48: Opening the quick closure

- ▶ Turn the quick closure a $\frac{1}{4}$ turn to the left until the two lugs on the head of the quick closure point diagonally from the corner towards the middle of the box. The quick closure is now unlocked.
- ▶ Repeat these steps for all other quick closures.
- ▶ Take the frame off of the box.
- ✓ The opening process is complete.

Mounting the door



Note

The GEOS enclosure with swivel lever is supplied without locking cylinder.

- ▶ When selecting the locking cylinder, please consider the operating conditions, e.g. rust protection for outdoor use.

Required tool: Screwdriver

Mounting

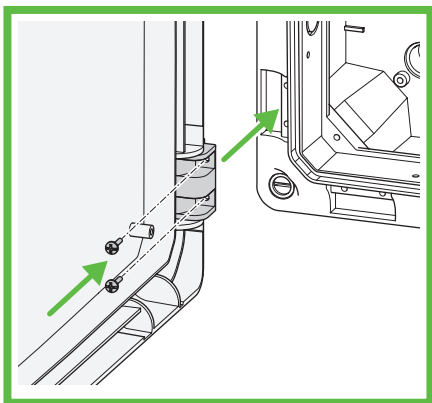


Fig. 49: Mounting the door

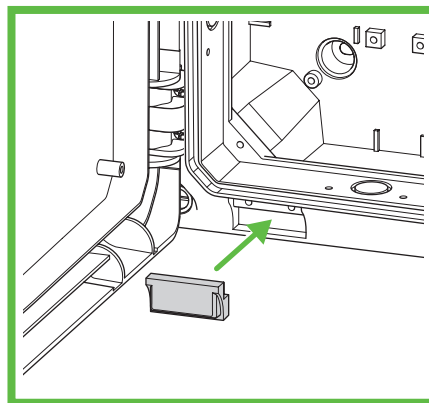


Fig. 13: Installation of the guiding elements GEOS-S 3040, GEOS-S 4030, GEOS-S 4050, GEOS-S 5040

- ▶ Screw the door onto the door frame.
- ▶ Only GEOS-S 3040, GEOS-S 4030, GEOS-S 4050, GEOS-S 5040: Insert the guiding elements into the frame.

Dismantling

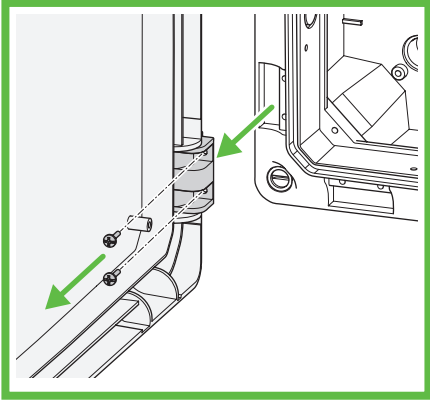


Fig. 50: Dismantling the door

- ▶ Unscrew the door from the door frame.

Adjusting the twist lock



Note

The internal twist locks can be turned by 90° (Abb. 64 and Abb. 65).

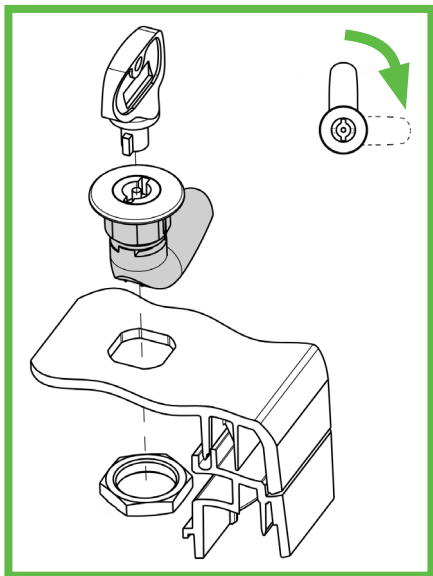


Fig. 51: Closing direction to right

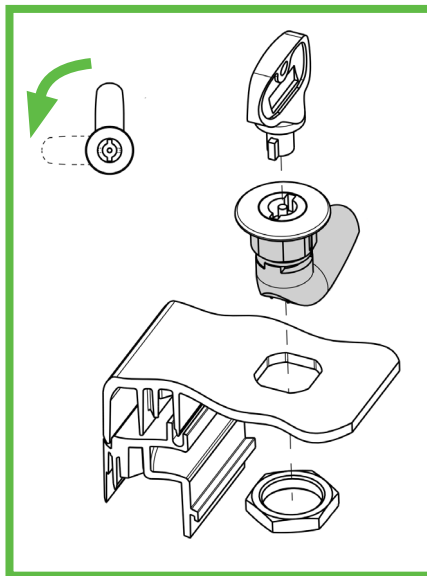


Fig. 14: Closing direction to left

- ▶ Loosen the locknut below the lock.
- ▶ Lift up the twist lock and insert it again turned by 90°.
- ▶ Tighten the locknut below the lock to 4 Nm.

Changing the door stop for variants with swivel lever

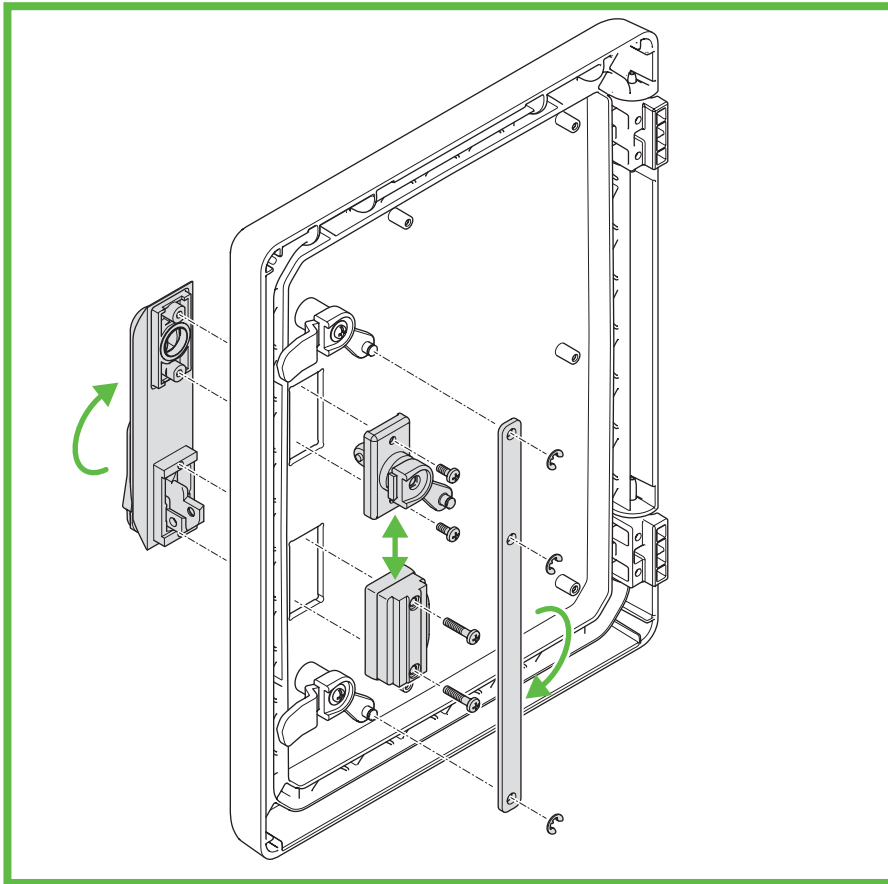


Fig. 52: Changing the door stop for variants with swivel lever

- ▶ Loosen the snap rings from the guide rod.
- ▶ Remove the guide rod.
- ▶ Unscrew the swivel lever.
- ▶ Rotate the swivel lever through 180°.
- ▶ Replace the guiding element and the lock.
- ▶ Screw the swivel lever onto the guiding element and the lock.
- ▶ Rotate the guide rod through 180°.
- ▶ Attach the guide rod with the snap rings to the guiding element and the latches.

Universal mounting accessories

Assembly plate

The assembly plate can be screwed directly onto the mounting plugs of the box floor with the enclosed screws on the mounting plugs.

Required tool: Screwdriver (PH2)

- ▶ Screw the assembly plate tightly to the mounting plugs using the screws provided. Recommended tightening torque: 2 Nm
- ✓ The installation process is complete

Standard rail

The standard rail can be screwed directly onto the mounting plugs of the box floor with the enclosed screws on the mounting plugs.

Required tool: Screwdriver (PH2)

- ▶ Screw the enclosed screws gently into the mounting plugs
- ▶ Fit the standard rail with the keyholes over the screws
- ▶ Tighten the screws. Recommended tightening torque: 1.8 Nm
- ✓ The installation process is complete

Mounting holder

The mounting holders are installed in two steps. Firstly, the base carrier is mounted in the box floor. In the second step, the mounting support is plugged onto the standard rail or assembly plate. This combination is then pushed into the pre-assembled base supports.

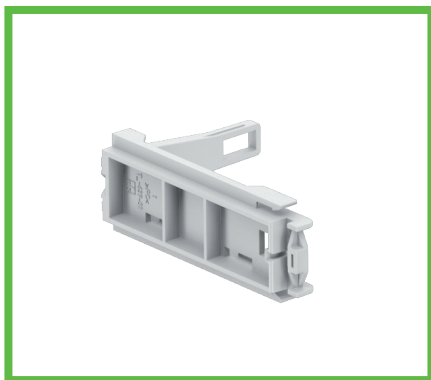


Fig. 53: Base carrier

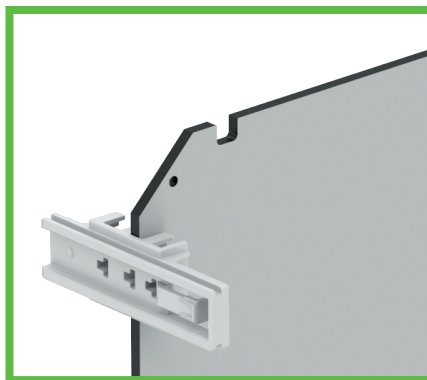


Fig. 15: Mounting carrier

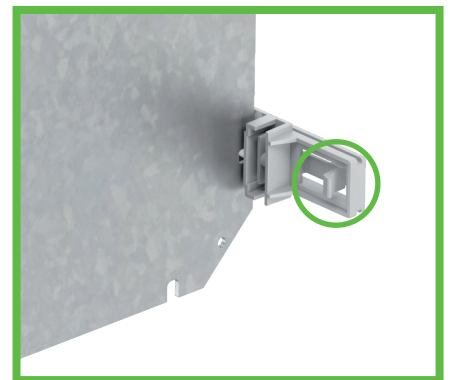


Fig. 16: Locking hooks

Mounting of base carriers

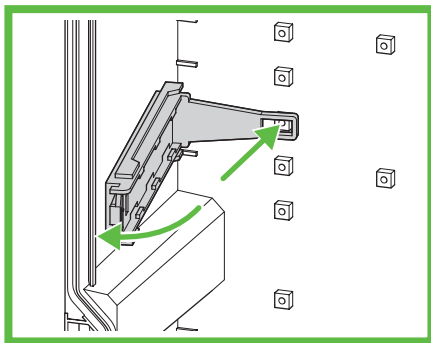


Fig. 54: Mounting of base carriers

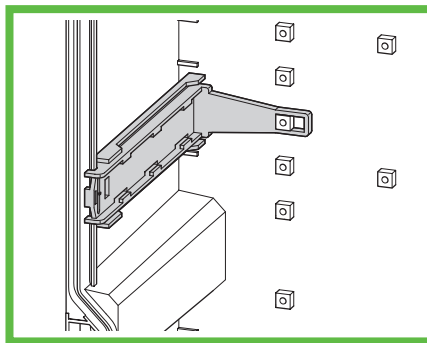


Fig. 17: Mounted base carrier

- ▶ Position the base carrier on a mounting plug in the box floor.
- ▶ Push the base carrier to the side wall until it snaps in.
- ✓ The installation of the base carrier is complete.



Note

Mounting base carriers on assembly plates

Before mounting the base carriers, check the position of the carriers with the selected assembly plate.

Dismantling base carriers

Required tool: Screwdriver (flat-blade screwdriver 4-5 mm)

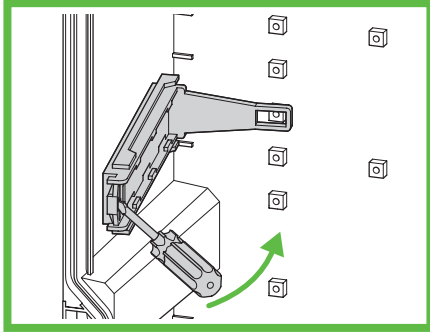


Fig. 55: Dismantling base carriers

- ▶ Before removing the base carrier, remove the mounting holder.
- ▶ Place the screwdriver in the recess on the base carrier and press the screwdriver slightly in the direction of the box floor.
- ▶ At the same time, tilt the top of the base carrier towards the centre of the box.
- ✓ Remove the base carrier.

Mounting the standard rail/assembly plate on the mounting holder

- ▶ Insert the standard rail or assembly plate into the mounting holder at the desired height.

Inserting the mounting holder into the base carrier

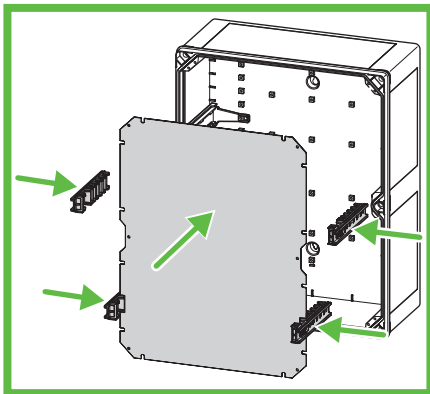


Fig. 56: Mounting the mounting holder in the base carrier

- ▶ Push the equipped mounting holders with the standard rail/assembly plate evenly into the pre-assembled base carriers until all mounting holders engage.

Dismantling the mounting holder

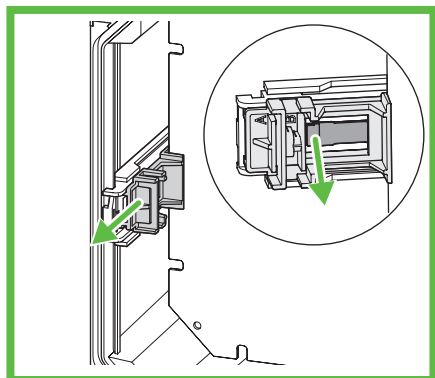


Fig. 57: Dismantling the mounting holder

- ▶ Pull the locking hook inwards until it engages.
- ▶ Repeat this procedure on all mounting holders.
- ▶ Remove the standard rail/assembly plate from the base carrier.



Note

Dismantling the mounting holder

When the mounting holder is removed from the base carrier, the locking hooks snap back into their original position.

Mounting the carrying frame

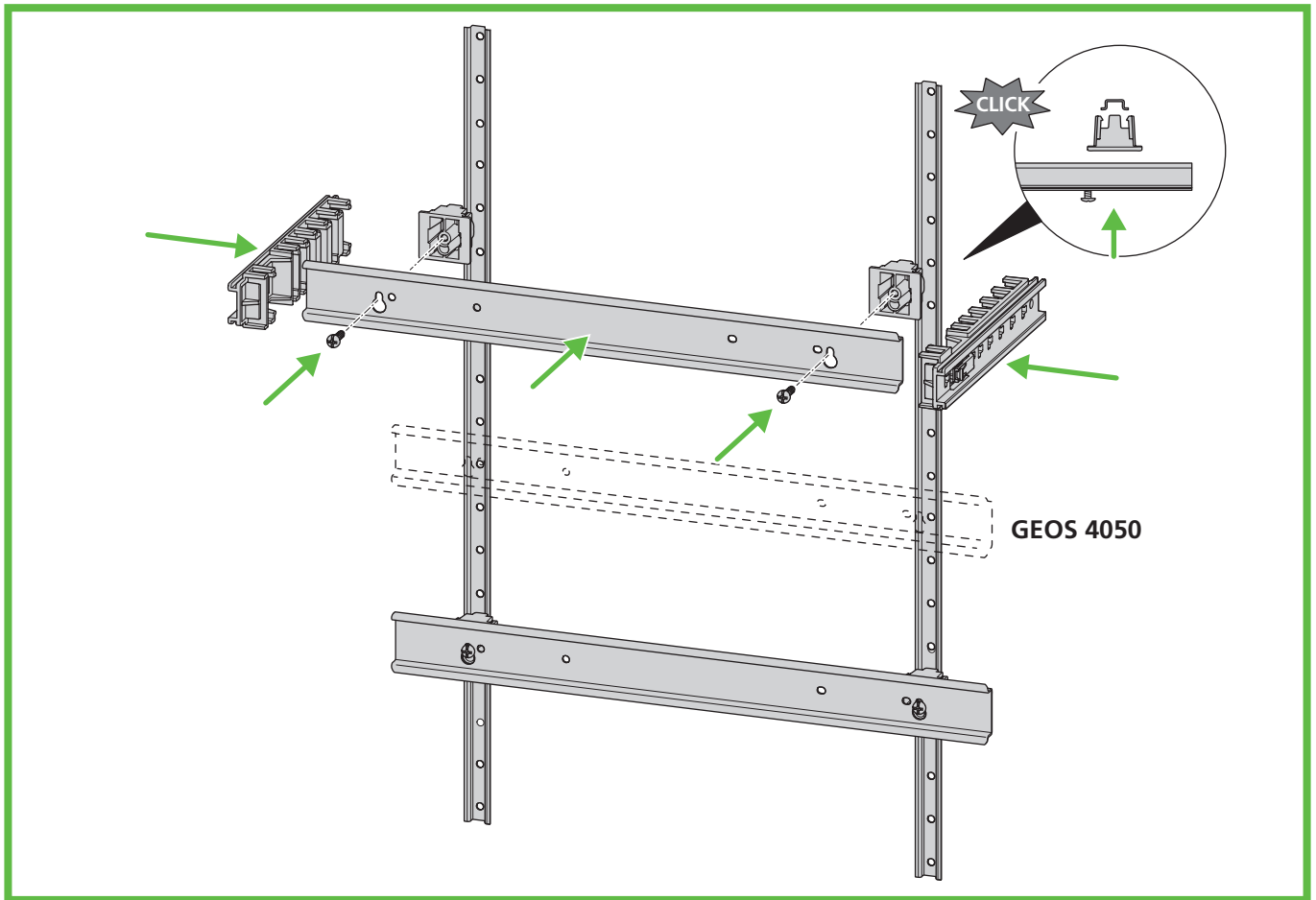


Fig. 58: Mounting the carrying frame

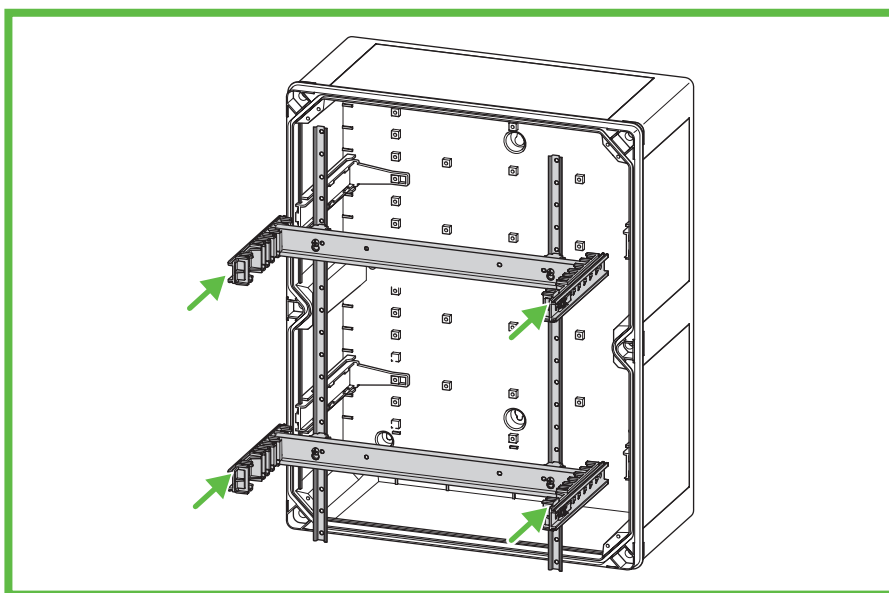


Fig. 59: Mounting the carrying frame in the box

Mounting of the GEOS MSS mast clamp set

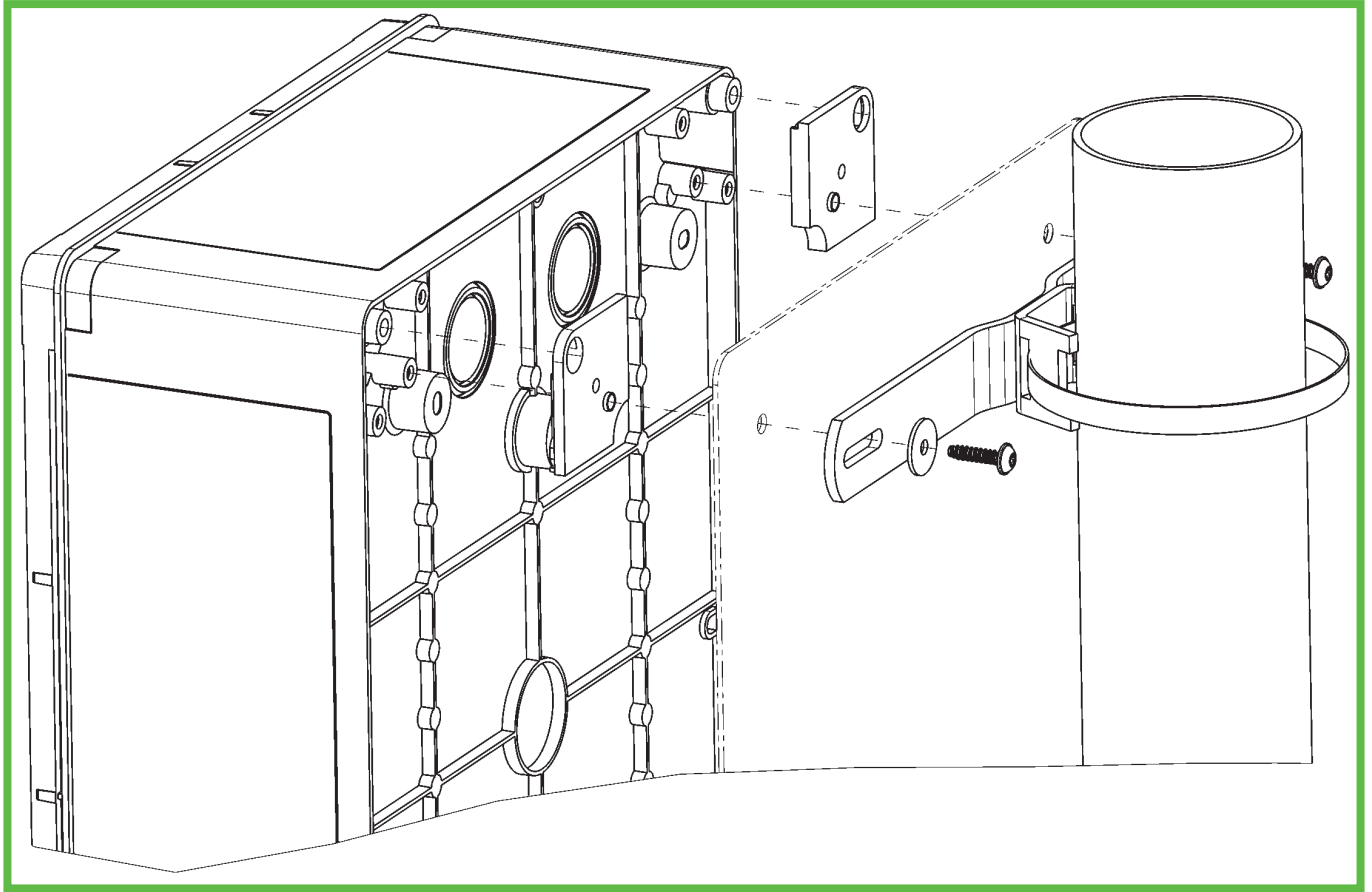


Fig. 60: Mounting of the mast clamp set

Empty enclosure mounting accessories

Mounting the partition wall

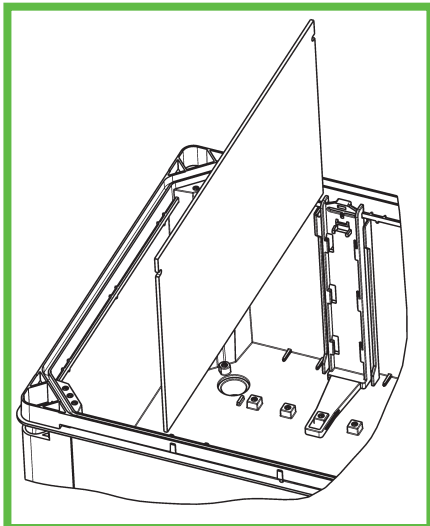


Fig. 61: Mounting the partition wall

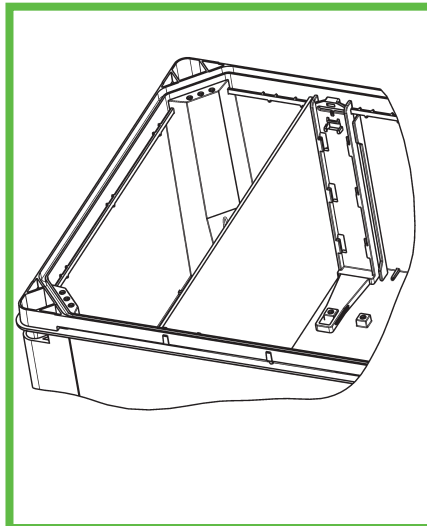


Fig. 18: Mounted partition wall

- ▶ Mount the base carriers in the box (see Mounting of base carriers).
- ▶ Place the partition wall with the recesses facing upwards in one of the two guides of the base carrier.

- ▶ Push the partition wall into the box until it engages.

Dismantling the partition wall

Required tool: Screwdriver (flat-blade screwdriver 4-5 mm)

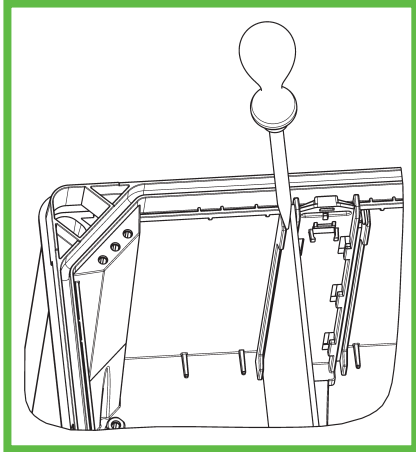


Fig. 62: Dismantling the partition wall

- ▶ Unlock the partition wall on the first base carrier and pull the partition wall out slightly.
- ▶ Unlock the partition wall at the second base carrier and pull the partition wall out slightly.
- ▶ Remove the partition wall.

Control cabinet mounting accessories

Mounting shock protection modules



Note

There are different shock protection modules for the various sizes of control cabinet. Only order the shock protection modules required for your control cabinet.

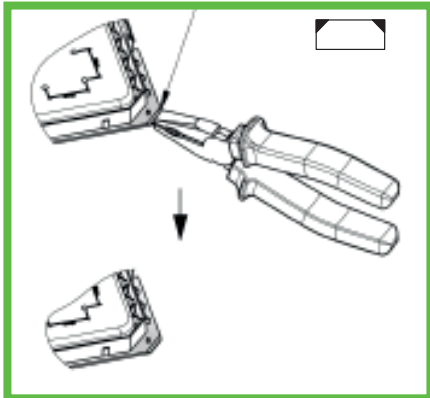


Fig. 63: GEOS-S 4050, GEOS-S 5040: Bend out corners



Fig. 19: Insert shock protection

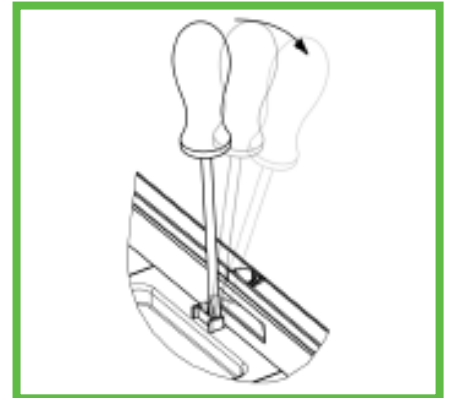


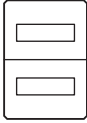
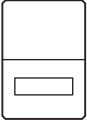
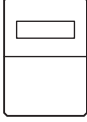



Fig. 20: Dismantling the shock protection

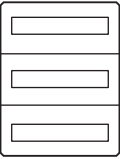
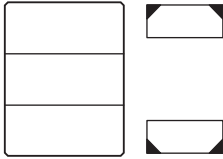
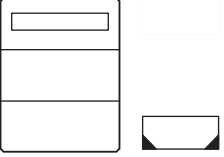
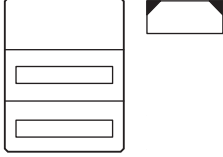
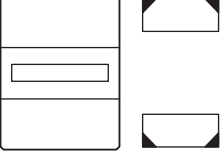
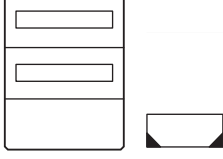
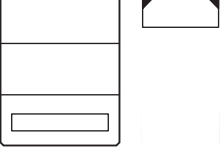
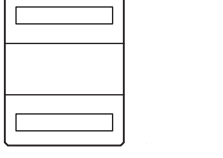
GEOS-S 3030

Configuration	Name
	GEOS-S BSM 3030
	GEOS-S BSM 3030-09

GEOS-S 3040, GEOS-S 4030

Configuration	Name	Configuration	Name	
	GEOS-S BSM 3040-9 GEOS-S BSM 3040-9	Set: GEOS-S BSM 3040-9/2		GEOS-S BSM 3040 GEOS-S BSM 3040-9
	GEOS-S BSM 3040-9 GEOS-S BSM 3040			GEOS-S BSM 3040 GEOS-S BSM 3040

GEOS-S 4050, GEOS-S 5040

Configuration	Name		Configuration	Name
	GEOS-S BSM 4050-15 GEOS-S BSM 4050-15/MIT GEOS-S BSM 4050-15	Set: GEOS-S BSM 4050-15/3		GEOS-S BSM 4050 GEOS-S BSM 4050 GEOS-S BSM 4050
	GEOS-S BSM 4050-15 GEOS-S BSM 4050 GEOS-S BSM 4050			GEOS-S BSM 4050 GEOS-S BSM 4050-15/MIT GEOS-S BSM 4050-15
	GEOS-S BSM 4050 GEOS-S BSM 4050-15/MIT GEOS-S BSM 4050			GEOS-S BSM 4050-15 GEOS-S BSM 4050-15/MIT GEOS-S BSM 4050
	GEOS-S BSM 4050 GEOS-S BSM 4050 GEOS-S BSM 4050-15			GEOS-S BSM 4050-15 GEOS-S BSM 4050 GEOS-S BSM 4050-15

Mounting the partition wall

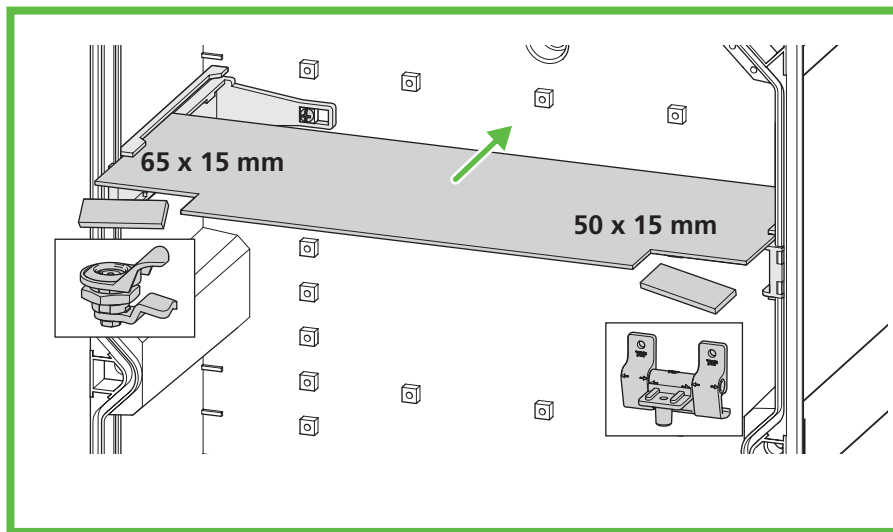


Fig. 64: Sawing recesses

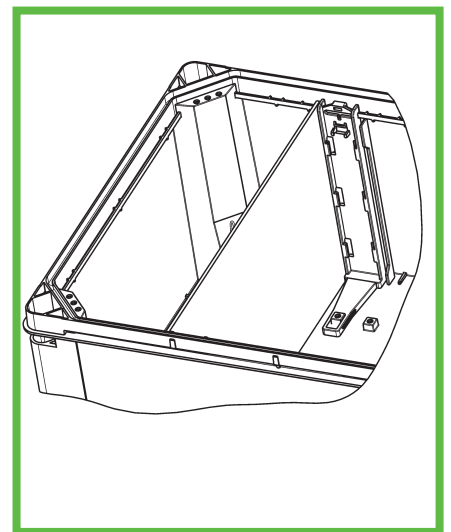


Fig. 21: Mounted partition wall

- ▶ **If an interior door is installed:** If necessary, saw openings for hinges or twist locks into the partition wall.
- ▶ Mount the base carriers in the box (see Mounting of base carriers).
- ▶ Place the partition wall with the recesses facing upwards in one of the two guides of the base carrier.
- ▶ Push the partition wall into the box until it engages.

Dismantling the partition wall

Required tool: Screwdriver (flat-blade screwdriver 4-5 mm)

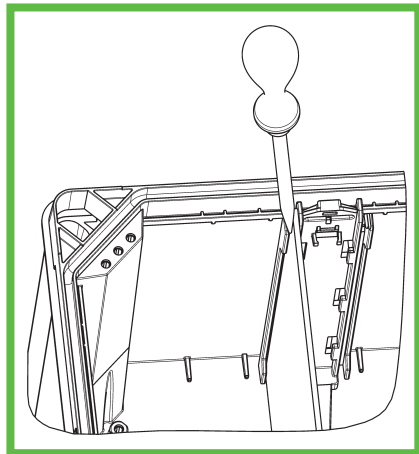


Fig. 65: Dismantling the partition wall

- ▶ Unlock the partition wall on the first base carrier and pull the partition wall out slightly.
- ▶ Unlock the partition wall at the second base carrier and pull the partition wall out slightly.
- ▶ Remove the partition wall.

Mounting the interior door

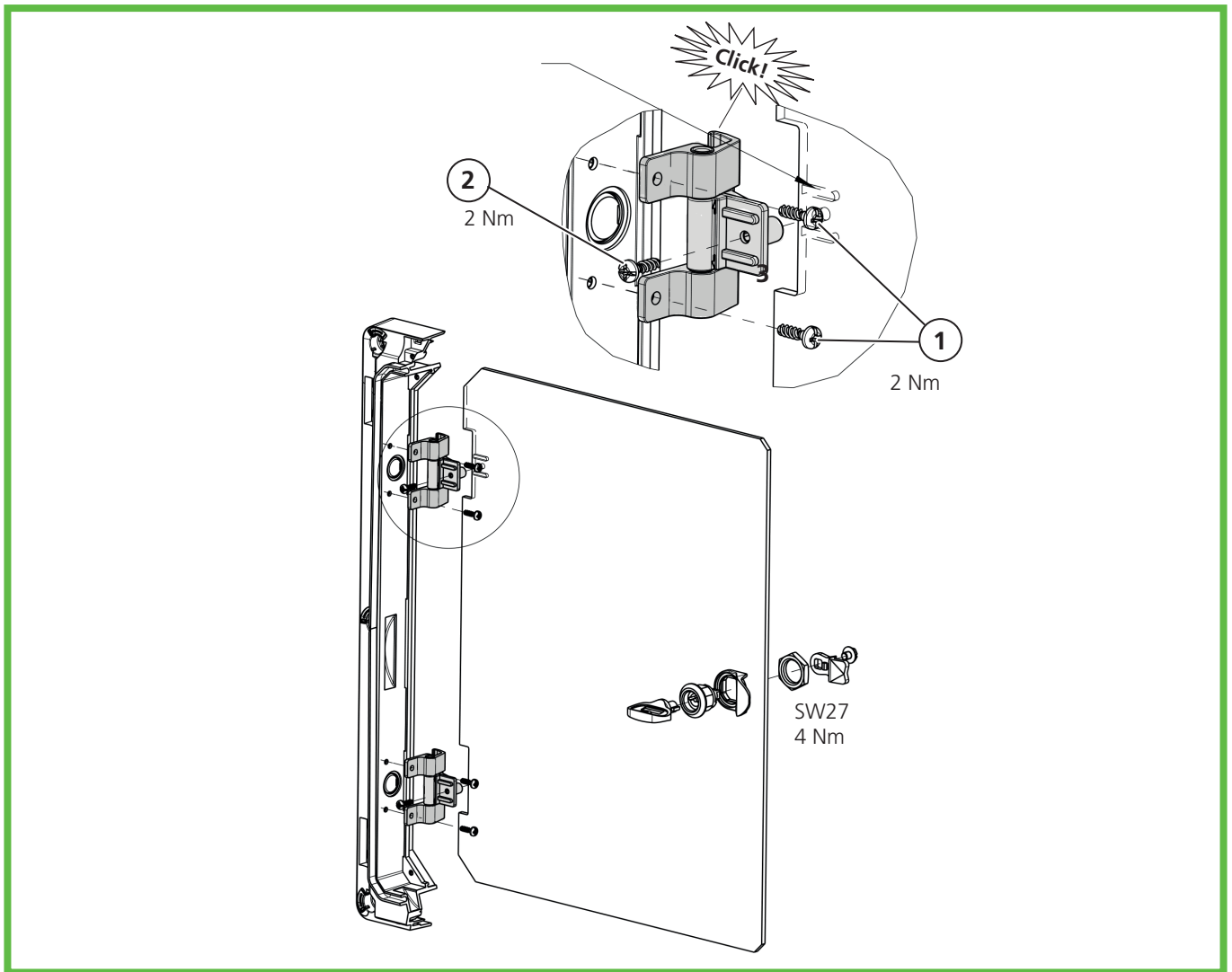


Fig. 66: Mounting the interior door

Mounting the door hinge

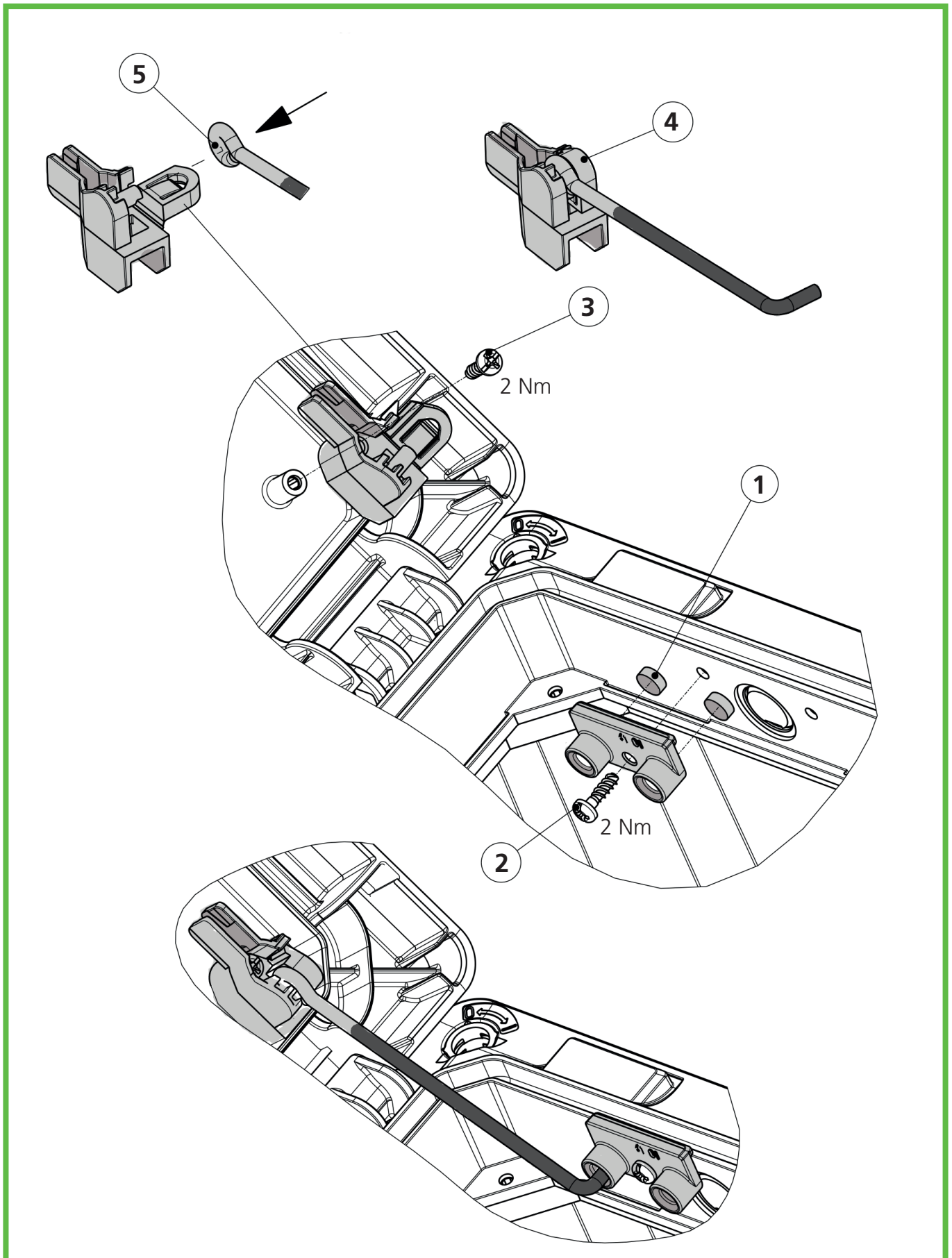


Fig. 67: Mounting the door hinge

Service

The "Drain Protect System" should be checked for contamination during maintenance work on the system. In the event of heavy exposure to dust, the Drain Protect System must be checked for dirt at regular intervals and cleaned if necessary.

The time intervals depend on the degree of contamination.



Fig. 68: Drain Protect System

Project planning

Project planning per IEC 61439-2

Title of the standard

Low voltage switchgear combinations – part 2: Energy-switchgear combination

Original manufacturer / switchgear combination manufacturer

The EN 61439 standards distinguish between the terms "original manufacturer" and "switchgear combination manufacturer".

Original manufacturer

Spelsberg is responsible as the "original manufacturer" for the original design of the GEOS enclosure system and has supplied the associated verifications according to the standard IEC 61439-2.

Switchgear combination manufacturer

The switchgear combination manufacturer is the organisation that takes responsibility for the finished switchgear combination. This includes the standard-compliant planning and wiring of the GEOS enclosure system, incl. on the basis of the electrical framework conditions, installation environment and operability, documented through the type and unit verification.

Type verification

In the following, Spelsberg supports the generation of the type verification. It is essential to comply with the specifications set out in this product manual regarding mounting the GEOS enclosure system, the installation of the wiring and the equipment. Irrespective of the information set out in this product manual, the manufacturer of the switchgear combination is responsible for applying the latest valid standard and the processes defined within it. The electrical framework conditions, installation environment and operability are to be defined by the user.

Application areas according to the standard operating conditions

The GEOS enclosure systems are intended for use under the following operating conditions:

Indoor installation

- Ambient temperatures of -5°C to +40°C.
- Although not higher than +35°C over a period of 24h.
- Relative air humidity below 50 % with a maximum temperature of 40°C, at lower temperatures a higher air humidity is also permitted.

Outdoor installation

- Ambient temperatures of -25°C to +40°C.
- Although not higher than +35°C over a period of 24 h.
- Relative air humidity of up to 100 % with a maximum temperature of +25°C.

Corrosion resistance / UV radiation

The corrosion resistance of the metal parts in the enclosure system has been verified in accordance with 10.2.2 of the standard, and the resistance to UV radiation in accordance with 10.2.4.

Degree of contamination

The GEOS enclosure systems have been designed for use with a degree of contamination of 3.

Maximum installation elevation

The maximum elevation of the installation site is 2000 m above sea level.



Note

Electrical characteristics

Note the feed-in limits („Elektrische Eigenschaften“, Seite 10).

Type verification according to section 10 of IEC 61439-1/-2

The following chapter specifications in brackets refer to chapter 10 of the standard IEC 61439-1/-2.

Verification provided by the original manufacturer

Corrosion resistance (chapter 10.2.2)

The metal parts inside the GEOS enclosure system pass the tests for sharpness A and are suitable for outdoor installation.

Characteristics of insulating materials (chapter 10.2.3)

The tests for verifying the heat resistance of enclosures have been passed.

Proof of the insulating materials' resistance to exceptional heat and fire due to internal electrical effects was provided on samples taken at a glow wire tip temperature of 850°C.

Resistance to ultraviolet (UV) radiation (chapter 10.2.4)

Representative sample bodies have been subjected to successful UV testing in accordance with ISO 4892-2, process A, cycle 1 with a total time of 500 h. This confirms suitability for outdoor installation.

Lifting (chapter 10.2.5)

The GEOS enclosure systems are suitable for vertical and horizontal wall mounting, horizontal floor mounting and, under certain conditions, ceiling mounting. The maximum loads that can be installed are listed in the following chapters:

- „Zubehör Leergehäuse“, Seite 22
- „Zubehör Leergehäuse“, Seite <?>

Impact testing (chapter 10.2.6)

GEOS enclosure systems meet the requirements of impact tests („IK Schutzgrad“, Seite 10).

Inscriptions (chapter 10.2.7)

The inscriptions applied have been successfully tested for wear resistance.

Protection rating of enclosures (chapter 10.3)

GEOS enclosure systems comply with the specifications for outdoor installation per IEC 61439, as well as the specifications for "Moist and wet areas and rooms" and "Outdoor systems" per DIN VDE 0100-737. The GEOS enclosure systems comply with IP66 and IP67 protection ratings, („IP Schutzgrad", Seite 10).



Note

IK and IP protection ratings

If changes, such as the installation of cable insertions, installation of command and message devices in GEOS enclosure systems, are implemented then the IK and IP protection rating must be reassessed.

Creepage distances (chapter 10.4.2)

No additional measures (e.g. cable fixing) are required with the GEOS enclosure systems due to their higher rated insulation voltage.

Rated insulation voltage, see chapter „Montage", Seite 28.

Protection against electric shock and electrical conductivity of the protective earth circuits (chapter 10.5)

The basic protection should prevent direct contact with dangerous, active parts.

With the specified IP protection rating, the GEOS enclosure systems provide the requisite protection if mounted correctly.

Electrical conductivity of the connection between bodies of the switchgear combination and protective earth circuits (chapter 10.5.2)

GEOS enclosure systems, as insulated enclosures, have no connection for a protective earth conductor.

There is therefore no requirement to perform the test. Protection against the consequences of a fault in the switchgear combination is provided by the protective measure "insulation".

Short circuit strength of the protective earth conductor (chapter 10.5.3)

The GEOS enclosure systems are intended for use in electrical networks, in which the prospective short circuit current I_{cp} does not exceed 10 kA.

Alternatively, the GEOS enclosure systems may be operated on a current-limiting protective device with a switch-off current of max. 17 kA. A test of the short circuit strength of the protective earth conductor is not required in this case.

Testing enclosures produced from insulating material (chapter 10.9.4)

The GEOS enclosure systems are suitable for rated insulation voltages of 1,000V AC and 1,500V DC. The corresponding tests have been passed successfully.

Short circuit strength (chapter 10.11)

The GEOS enclosure systems are intended for use in electrical networks, in which the prospective short circuit current I_{cp} does not exceed 10 kA.

Alternatively, the GEOS enclosure systems may be operated on a current-limiting protective device with a switch-off current of max. 17 kA.

Verification of the short circuit strength is therefore not required for the type verification.

Electromagnetic compatibility (chapter 10.12)

As pure enclosures, GEOS enclosure systems behave passively from an EMC point of view.

Protection of the installations against electromagnetic interference in the environment, as well as protection of the environment against electromagnetic interference arising in the enclosure due to the equipment is not provided.

General information (chapter 10.12 – J.9.4.1/2)

Differentiation is made between two environments in the field of EMC:

■ **Environment A:**

These are mainly industrial environments where the power supply network is fed by a dedicated transformer.

■ **Environment B:**

This environment encompasses residential, retail and commercial areas, as well as small companies, which are directly connected to the public low voltage grid.

Further details can be found in EN 61439-1, Annex J.

On complete switchgear and controlgear combinations, testing of EMC immunity and EMC emission is not required if the following two conditions are fulfilled:

- The integrated equipment has been designed for the stipulated environment (A or B) in accordance with the applicable EMC product standard or basic generic standard.
- The internal construction and wiring are configured according to the specifications of the equipment manufacturer.

Verifications to be supplied by the manufacturer of the switchgear combination

Clearances (chapter 10.4.1)

The clearances between active parts are dependent on the rated surge voltage resistance (U_{imp}).

This in turn is dependent on the installation area and the mains voltage, as well as the mains configuration of the electrical mains.

Protection against electric shock and electrical conductivity of the protective earth circuits (chapter 10.5)

Devices and circuits must be arranged such that their operation and maintenance are eased and the requisite protection is simultaneously assured.

Effectiveness of the protective earth conductor (chapter 10.5.1)

The effectiveness of the protective earth conductor must be verified for protection against the consequences of a fault in the switchgear combination per 10.5.2.

The effectiveness of the protective earth conductor must be verified for protection against the consequences of a fault in external circuits, which are fed from the GEOS enclosure systems, per 10.5.3.

Installation of equipment (chapter 10.6)

GEOS enclosure systems are not suitable for “operations” and “removable parts” according to standard EN 61439.

The equipment must comply with the standards applicable to it, and it must be suitable for the respective application case.

It is necessary in particular to note:

- Rated voltage
- Rated currents
- Rated frequency
- Service life
- Making and breaking capacity
- Short circuit strength

If the short circuit strength and/or breaking capacity of the installed equipment is insufficient for the loads that arise at the installation site, the equipment must be protected by current-limiting devices. In this instance, care must be taken to ensure that the equipment is coordinated accordingly in order to prevent unintended switch-offs.

The equipment installation must take place in accordance with the manufacturer's specifications.

The power loss given off by the devices causes the air in the enclosure to heat up. Temperature-sensitive equipment should therefore always be installed in the bottom area of the enclosure. The equipment must be easily accessible for the user.

Unless otherwise agreed, the standard IEC 61439 defines the following specifications:

- Connections, apart from protective earth conductor connections, must be at least 0.2 m above ground level and arranged such that the cables and lines are easy to connect.
- Displays to be read off must be positioned between 0.2 and 2.2 m above the standing area of the operator.
- EMERGENCY STOP actuation elements must be positioned between 0.8 and 1.6 m above the standing area of the operator.

Internal electrical circuits and connections (chapter 10.7)

The cables laid inside the GEOS enclosure system must be suitable for the respective application case. The use of bare conductors is not intended in the GEOS enclosure system. The conductors must be suitable for the rated insulation voltage, the rated current and connection to the equipment.

When laying the cables it is necessary to ensure that these are not laid over sharp edges.

The standard rails installed, as well as the optionally available assembly plates, are not critical here.

The conductor cross-section must be selected depending on the rated current of the respective circuit (Inc).

The higher temperature inside the enclosure may negatively affect the current carrying capacity of the conductor.

Connections for externally in-fed conductors (chapter 10.8)

GEOS enclosure systems are delivered without connections for externally fed-in conductors.

Insulation properties (chapter 10.9) General information (chapter 10.9.1)

Each circuit of the switchgear combination must withstand intermittent and transient overvoltage. This must be ensured through dielectric strength testing.

When doing so, disconnect the current carrying devices in the switchgear combination (e.g. windings, measuring devices, overvoltage protection devices) that would trigger a current flow with application of the test voltage. Likewise, devices that are not designed for the test voltage must also be disconnected.

All further equipment must be connected.

Frequent operational dielectric strength (chapter 10.9.2)

Main circuits, as well as auxiliary and control circuits connected to the main circuit, must be tested with the following test voltages.

Rated insulation voltage U_i (Conductor against conductor, AC or DC)			Test voltage (AC effective value)	Test voltage (DC)
	$U_i \leq$	60	1,000	1,415
60	$< U_i \leq$	300	1,500	2,120
300	$< U_i \leq$	690	1,890	2,670
690	$< U_i \leq$	800	2,000	2,830
800	$< U_i \leq$	1,000	2,200	3,110
1000	$< U_i \leq$	1,500	-	3,820

Table 8 of standard IEC 61439-1

AC or DC auxiliary and control circuits not connected to the main circuit, must be tested with the following test voltages:

Rated insulation voltage U_i (Conductor against conductor, AC or DC)			Test voltage (AC effective value)
	$< U_i \leq$	12	250
12	$< U_i \leq$	60	500
60	$< U_i$		see DIN EN 61439-1, Table 8

Table 9 of standard IEC 61439-1

Further test details can be found in the standard IEC 61439-1.

Surge voltage resistance (chapter 10.9.3)

The standard offers two possibilities for verification:

- Testing
- Expert assessment

Expert assessment according to 10.9.3.5 takes place through measuring or checking the dimensions in the design drawings. When doing so, the clearances must exhibit at least 1.5 times the value of the data stipulated in the following table.

Rated impulse withstand voltage U_{imp} [kV]	Minimum clearance [mm]	Minimum clearance x 1.5 [mm]
≤ 2.5	1.5	2.25

Rated impulse withstand voltage Uimp [kV]	Minimum clearance [mm]	Minimum clearance x 1.5 [mm]
4.0	3.0	4.50
6.0	5.5	8.25
8.0	8.0	12.00
12.0	14.0	21.00

Through evaluation of the data of the equipment manufacturer it is necessary to verify that all installed equipment is suitable for the specified rated surge voltage resistance Uimp. The possibility of verification through testing must be taken from the standard where required.

Verification of heating (chapter 10.10)

GEOS enclosure systems offer the option of using equipment of various designs, sizes and manufacturers. This results in a wide range of equipment variants.

Spelsberg, as the original manufacturer of the switchgear combination, does not desire a limiting specification of the equipment for the switchgear manufacturer or the user. For this reason, verification of GEOS enclosure systems heating must be maintained by means of the expert assessment of a switchgear combination with a single compartment.

Verification through expert assessment (chapter 10.10.4)

The process may be applied for GEOS enclosure systems in networks with a maximum frequency of 60 Hz, if the following conditions are fulfilled according to 10.10.4.2.1:

- a) The information regarding the power loss of all installed devices is available from the device manufacturers.
- b) The power loss within the GEOS enclosure system is distributed approximately evenly.
We recommend not to exceed the power losses listed in the „Technische Daten GEOS“, Seite 67 chapter.
- c) The rated currents of the circuits of the switchgear combination must not exceed 80 % of the conventional thermal currents in free air (I_{th}) or the rated currents of the equipment (I_n) in the circuit. Depending on the equipment, the designation of the permanent operating current, which is conducted without overheating, may deviate. For example for contactors for the rated operating current I_e AC1, for circuit breakers I_n. The reduced rated current can lead to a reduced power loss emission.

Example

A miniature circuit breaker B16A may be loaded with a maximum 12.8 A. If a rated current (I_{nc}) of 16 A is required for the outgoing circuit then this circuit must be equipped with a miniature circuit breaker B20A (20 A * 0.8 = 16 A).

Equipment exists, for which the power loss is:

- a. current-independent,
- b. essentially proportional to I,
- c. essentially proportional to I².

The actual power loss given off is calculated for:

- a. $P_{nc} = P_n$
- b. $P_{nc} = P_n (I_{nc}/I_n)$
- c. $P_{nc} = P_n (I_{nc}/I_n)^2$

With:

P_{nc} Power loss with rated current of the circuit

- Inc Rated current of the circuit
- Pn Power loss with rated current of the equipment
- In Rated current of the equipment

With outgoing circuits, it is additionally necessary to consider the loading factor (RDF).

With outgoing circuits the actual power loss of the equipment is calculated according to the formula:

- a. $P_{nc} = P_n * K^2$
- b. $P_{nc} = P_n (I_{nc}/I_n) * K^2$
- c. $P_{nc} = P_n (I_{nc}/I_n)^2 * K^2$

Example:

A miniature circuit breaker B10A, which gives off a power loss of 1.5 W with a load of 10 A, gives off just 0.96 W according to the formula above with an actual rated current in the circuit of 8 A.

$P_{nc} = 1,5 W (8 A/10 A)^2 = 0.96 W$

If, for example, 10 miniature circuit breakers are now used in a GEOS enclosure system for safeguarding the outlets then according to EN 61439-3 table 101, it is possible to assume an RDF of 0.5 and the resultant actual power loss for an individual miniature circuit breaker is:

$P_{nc} = 1.5 W (8 A/10 A)^2 = 0.96 W * 0.5^2 = 0.24 W$

Table 101 of EN 61439-2

If no agreement exists between the manufacturer of the PSC and the user regarding the respective load currents then the assumed load of the outgoing circuits of the PSC or a group of outgoing circuits may be determined based on the values in table 101 of IEC 61439-2.

Type of loading	Assumed loading factor
Power distribution 2 and 3 circuits	0.9
Power distribution 4 and 5 circuits	0.8
Power distribution 6 to 9 circuits	0.7
Power distribution 10 or more circuits	0.6
Position actuator	0.2
Motors ≤ 100kW	0.8
Motors > 100kW	1.0

- d) The mechanical parts and the equipment installed must be arranged such that the air circulation is not significantly impaired.
- e) Conductors carrying currents above 200A and adjacent structural parts are arranged to minimise eddy currents and hysteresis losses.
- f) All conductors must exhibit a minimum cross-section corresponding with 125 % of the permissible rated current of the associated circuit.

From the example:

Miniature circuit breaker B16A, rated current (Inc) 12.8 A

Minimum cross section for 12.8 A * 125 % = 16 A

Miniature circuit breaker B20A, rated current (Inc) 16 A

Minimum cross section for 16 A * 125% = 20 A

- g) The information regarding heating depending on the power loss generated in the enclosure system for the wall mounted installation of the GEOS enclosure system has been determined through testing per 10.10.4.2.2 of IEC 61439-1 and is set out in the chapter „Technische Daten GEOS“, Seite 67.

The occurring power loss of all circuits including the internal wiring (for calculation see Annex H of IEC 61439-1) must be calculated on the basis of the rated current of the circuits. The total installed power loss of the GEOS enclosure system is calculated by adding the individual outgoing and incoming circuits.

When doing so, bear in mind that the sum total of the outgoing currents is limited to the rated current of the GEOS enclosure system.

The heating inside the GEOS enclosure system dependent on the installed power loss is printed in the technical annex.

Example application:

1x D02 fuse element $I_n = 63$ A, 3-pole, fuse elements 50 A, in-feed

1x RCD $I_n = 63$ A, 30 mA, 4-pole, 10 miniature circuit breakers $I_n = 10$ A, 1-pole, outgoings,

Max. rated current of each circuit $I_{nc} = 8$ A,

assumed loading factor per EN 61439-2, table 101: 0.6

In addition, it is also necessary to take into consideration the wiring and connection line in the enclosure (see also Annex H of IEC 61439). Example assumption with total 5 W.

No.	Equipment	I_n	P_n with I_n	I	P with I	RDF	Number	P_{ges}
1	D02 fuse element 63A, 3-pole	63 A	1.5 W	50 A	0.9 W	1	1	0.9 W
2	D02 fuse insert 50A	50 A	5 W	50 A	5 W	1.	3	15 W
3	RCD 63A, 30mA, 4-pole	63 A	12 W	50 A	7.6 W	1.	1	7.6 W
4	Circuit breaker 10A, 1-pole	10 A	1.5 W	8 A	0.96 W	0.6	10	3.5 W
5	Line							5 W
								31.9 W

As such, a total power of 31.9 W is fed into the enclosure system.

With a GEOS 3030-18 enclosure system the temperature would increase by approx. 35 K in the upper third, and with a horizontally mounted GEOS 4050-22 enclosure system by approx. 20 K.

Together with the ambient temperature of the GEOS enclosure system, this results in the total internal temperature.

The installed devices must be suitable for this temperature.

Electromagnetic compatibility (chapter 10.12)

Resistance to interference (chapter 10.12 – J.9.4.4)

Under normal operating conditions GEOS enclosure systems, in which no electronic equipment is installed, are not sensitive to electromagnetic interference. In this case a resistance to interference test per IEC 61439-1 is not required. In other cases it may be necessary to test the electromagnetic compatibility in accordance with IEC 61439-1, Annex J.10.12.

Interference emissions (chapter 10.12 – J.9.4.4)

With GEOS enclosure systems which contain no electronic circuits, verification per IEC 61439-1 is unnecessary. In other cases it may be necessary to test the electromagnetic compatibility in accordance with IEC 61439-1, Annex J.10.12.

Unit verification according to section 11 of EN 61439-1/-2

Unit verification must be performed on all switchgear combinations and serves to determine material and production faults, as well as ensuring correct functionality.

Template for unit verification per IEC 61439-2

The following template for unit verification is based on an unmodified enclosure, system as well as the use of cable insertions with a protection rating of min. IP66/IP67.

The information for the minimum dimensions of the clearance and creepage distances, as well as the insulation properties, is based on the following data:

- Overvoltage category: II (load level)
- Power supply system: 4-conductor 3-phase system, middle point earthed
- Rated voltage of the power supply system U_n [V]: 400V AC
- Rated insulation voltage U_i [V]: 400V AC
- Rated current of the switchgear combination I_n [A]: max. 125 A

Unit verification per EN 61439-2

Number	Test type	Tests	YES	Not specified
11.2	S	Sheath protection type IP 66/IP 67	<input type="checkbox"/>	<input type="checkbox"/>
11.3	S / E	Air and creepage distances Air distance by surge voltage test with 5.1kV ACeff (1.2/50µs) if air gap < 4.5mm, otherwise electrical test of creepage distance by visual inspection: 6.3mm	<input type="checkbox"/>	<input type="checkbox"/>
11.4	S / E	Protection against electric shock and continuity of the protective earth circuits Protection against direct contact with active parts, continuity of the protective earth (Resistance measurement with min. 10A, max. 0.1 Ω)	<input type="checkbox"/>	<input type="checkbox"/>
11.5	V	Installation of equipment Concordance with the circuit documents and other documents, identification and labelling, completeness of the user and service documents	<input type="checkbox"/>	<input type="checkbox"/>
11.6	M	Internal connections Check screwed connections on a random sampling basis for the correct tightening torque	<input type="checkbox"/>	<input type="checkbox"/>
	E	Internal electrical circuits Faultless wiring in concordance with the circuit documents	<input type="checkbox"/>	<input type="checkbox"/>
11.7	V	Connections for externally in-fed conductors Connection, type and identification of connections must agree with the production documents	<input type="checkbox"/>	<input type="checkbox"/>
11.8	M	Mechanical function Check mechanical actuation elements, locking mechanisms and seals	<input type="checkbox"/>	<input type="checkbox"/>
11.9	E	Insulation characteristics Measurement of insulation resistance with 500V DC between circuits and bodies: R > 400 k Ohm	<input type="checkbox"/>	<input type="checkbox"/>
11.10	S / E	Wiring, operating behaviour, function	<input type="checkbox"/>	<input type="checkbox"/>
		Checking labelling, wiring electrical function testing	<input type="checkbox"/>	<input type="checkbox"/>

Test types: S= Visual inspection, M= mechanical testing,

E= Electrical testing,V= Comparison with production documents

GEOS technical data

	GEOS 3030-L/-S-18	GEOS 3030-L/-S-22	GEOS 3040-L/-S-18	GEOS 3040-L/-S-22
Rated current AC/DC	1000 V/1500 V			
Weight / unit [kg]	1.9	2.1	2.2	2.6
Length [mm]	300		400	
Width [mm]	300			
Height [mm]	180	226	180	226
Internal length [mm]	271		371	
Internal width [mm]	271			
Internal height [mm] with/without mounting plug	140.5/158	186.5/204	140.5/158	186.5/204
Box/frame material	PC GF			
cover/door material	PC			
Seal material	Elastomer			
Cover screw material	PA6GF			
Type of protection	IP 66 / IP 67			
IK* (front, side)	09			
Colour	grey, simil. RAL 7035 / black, simil. RAL 9005			
Ambient temp. min. [°C] ** Without installations	-35			
Ambient temp. min. [°C] ** with installations	-25			
Ambient temp. max [°C] **	80			
Ambient temp. 24h [°C] **	60			
max. rel. humidity 25°C	95%			
max. rel. humidity 40°C	50%			
Halogen-free	yes			
Heavy metal-free	yes			
PVC-free	yes			
Silicone-free ***	yes			
Sealable	only "-L" variants			
Standards	IEC 62208, IEC 61439, UL 50/UL 50E, CSA 22.2			

* The IK protection rating has been tested at -25°C

** Ambient temperature: The specified ambient temperature refers to the components of the enclosure and accessories. The ambient temperature of the installed equipment must be observed.

*** The seal used is made of bonded silicone and approved by the manufacturer for automotive applications

	GEOS 4030-S-18	GEOS 4030-S-22	GEOS 4050-L-S-22	GEOS 5040-S-22
Rated current AC/DC	1000 V/1500 V			
Weight / unit [kg]	2.2	2.6	3.8	3.8
Length [mm]	300		500	400
Width [mm]	400			500
Height [mm]	180	226		
Internal length [mm]	271		471	371
Internal width [mm]	371			471
Internal height [mm] with/without mounting plug	140.5/158	186.5/204		
Box/frame material	PC GF			
Grey or transparent cover/door material	PC			
Seal material	Elastomer			
Cover screw material	PA6GF			
Type of protection	IP 66 / IP 67			
IK* (front, side)	09			
Colour	grey, simil. RAL 7035			
Ambient temp. min. [°C] ** Without installations	-35			
Ambient temp. min. [°C] ** with installations	-25			
Ambient temp. max [°C] **	80			
Ambient temp. 24h [°C] **	60			
max. rel. humidity 25°C	95%			
max. rel. humidity 40°C	50%			
Halogen-free	yes			
Heavy metal-free	yes			
PVC-free	yes			
Silicone-free ***	yes			
Sealable	only "-L" variants			
Standards	IEC 62208, IEC 61439, UL 50/UL 50E, CSA 22.2			

* The IK protection rating has been tested at -25°C

** Ambient temperature: The specified ambient temperature refers to the components of the enclosure and accessories. The ambient temperature of the installed equipment must be observed.

*** The seal used is made of bonded silicone and approved by the manufacturer for automotive applications

Power loss data for individually mounted GEOS enclosure systems

				$\Delta T= 10K$	$\Delta T= 20K$	$\Delta T= 30K$	$\Delta T= 40K$
Type	Mounting	Inner dimensions	Enclosure height	[W]			
GEOS-L/-S 3030-18		290 x 290 x 152.5 mm	50%	8.5	20.2	33.4	47.7
			75%	6.9	16.4	27.2	38.9
GEOS-L/-S 3030-22		290 x 290 x 198.5 mm	50%	10.5	24.9	41.2	59.0
			75%	8.6	20.3	33.6	48.1
GEOS-L/-S 3040-18	upright	290 x 390 x 152.5 mm	50%	11.3	26.8	44.4	63.5
			75%	8.9	21.0	34.8	49.7
GEOS-L/-S 3040-22	upright	290 x 390 x 198.5 mm	50%	12.9	30.6	50.7	72.6
			75%	10.1	24.0	39.7	56.8
GEOS-L/-S 3040-18 GEOS-S 4030-18	across	390 x 290 x 152.5 mm	50%	11.1	26.4	43.6	62.4
			75%	9.4	22.3	37.0	52.9
GEOS-L/-S 3040-22 GEOS-S 4030-22	across	390 x 290 x 198.5 mm	50%	12.7	30.0	49.8	71.2
			75%	10.8	25.5	42.2	60.3
GEOS-L/-S 4050-22	upright	390 x 490 x 198.5 mm	50%	18.3	43.3	71.7	102.6
			75%	14.5	34.2	56.7	81.1
GEOS-L 4050-22 GEOS-S 5040-22	across	490 x 390 x 198.5 mm	50%	18.0	42.7	70.8	101.2
			75%	15.2	35.9	59.5	85.1

Permissible power loss P_{per} in Watts per DIN VDE 0660-507 for **individually-mounted enclosure systems** with stipulated T.

Power loss at 50% housing height and [75%] enclosure height.

Dimensioned drawings

GEOS 3030-18 Dimensioned drawing

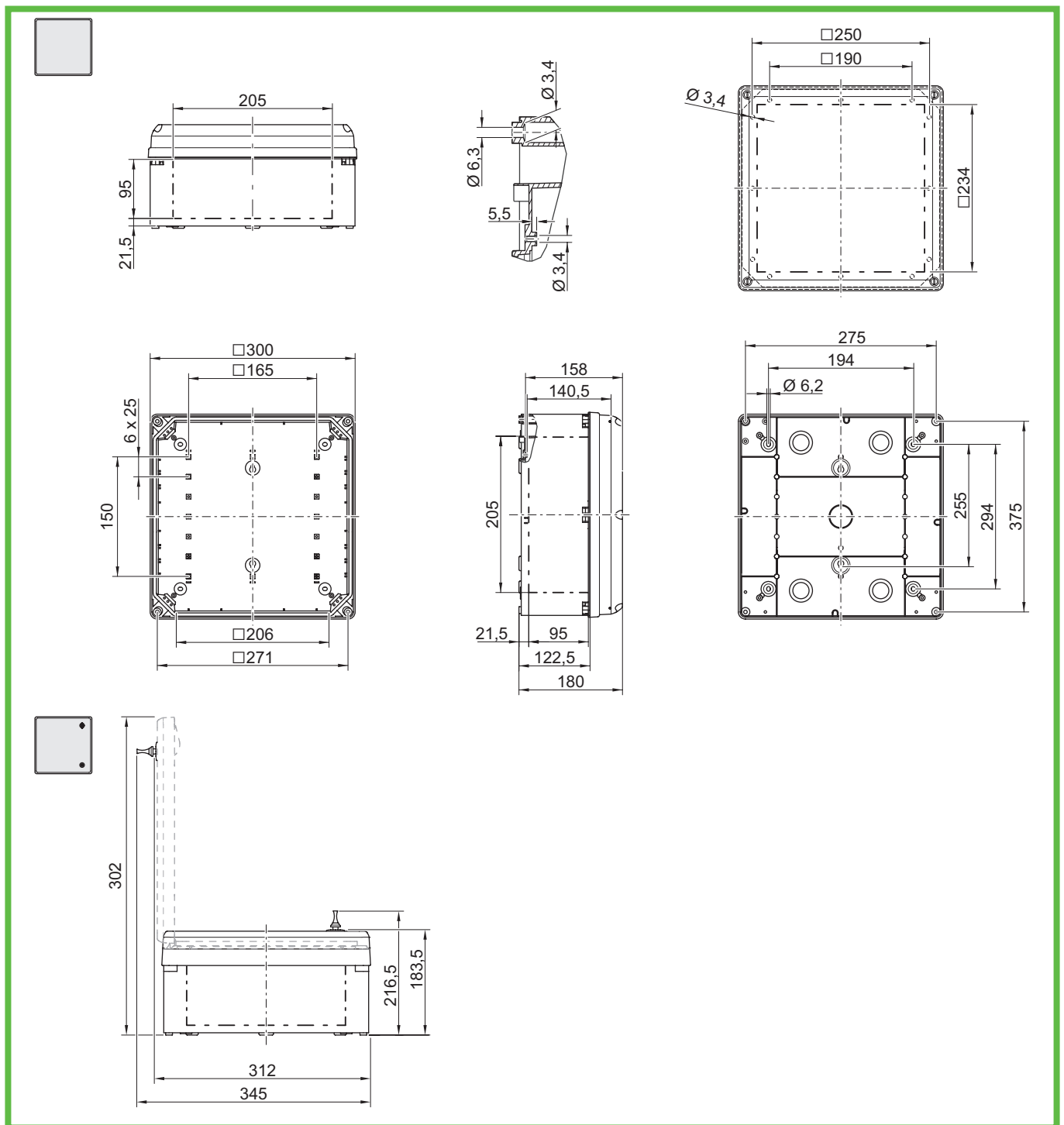


Fig. 69: GEOS 3030-18

GEOS 3030-22 Dimensioned drawing

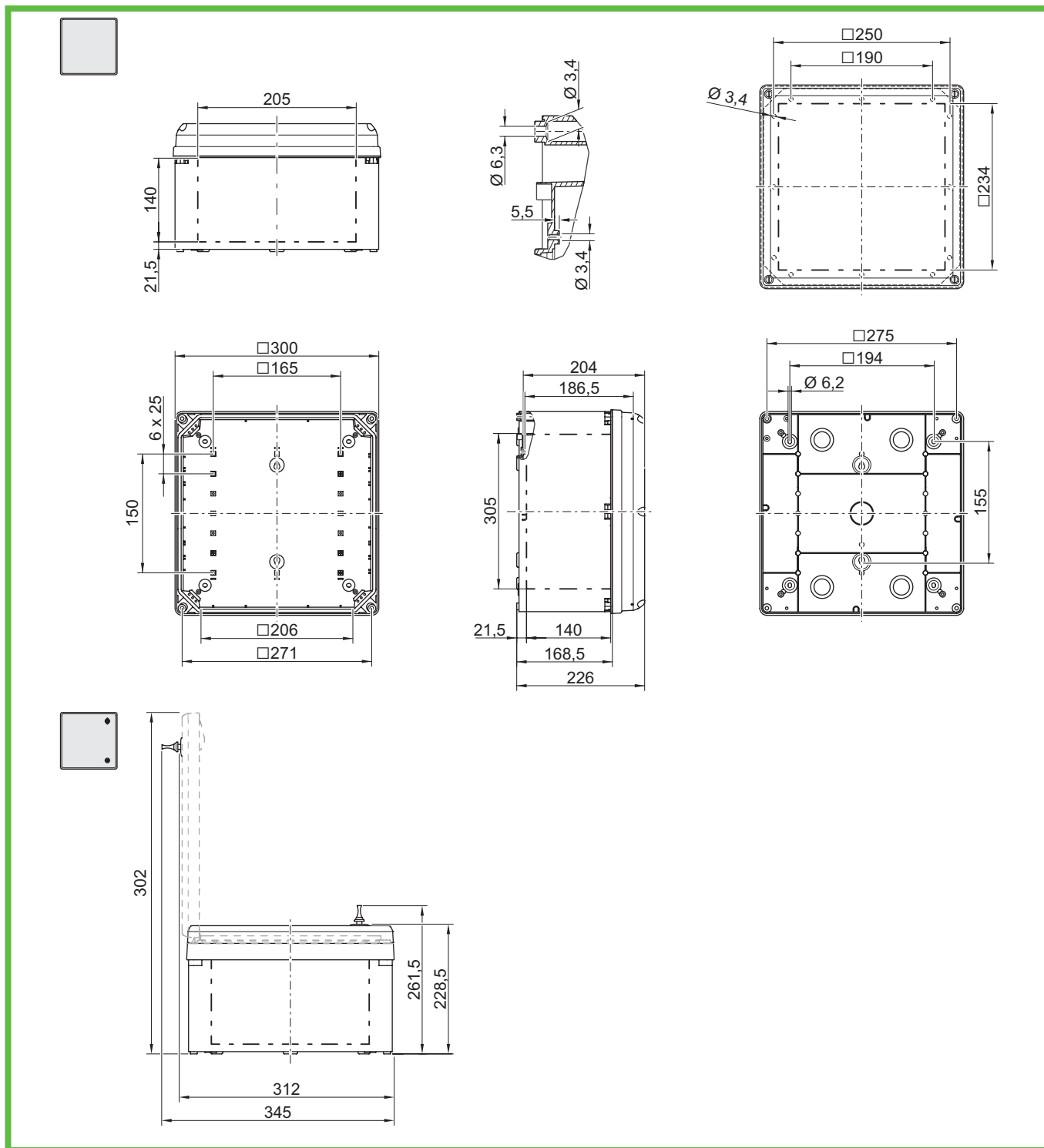


Fig. 70: GEOS 3030-22

GEOS 3040-18 Dimensioned drawing

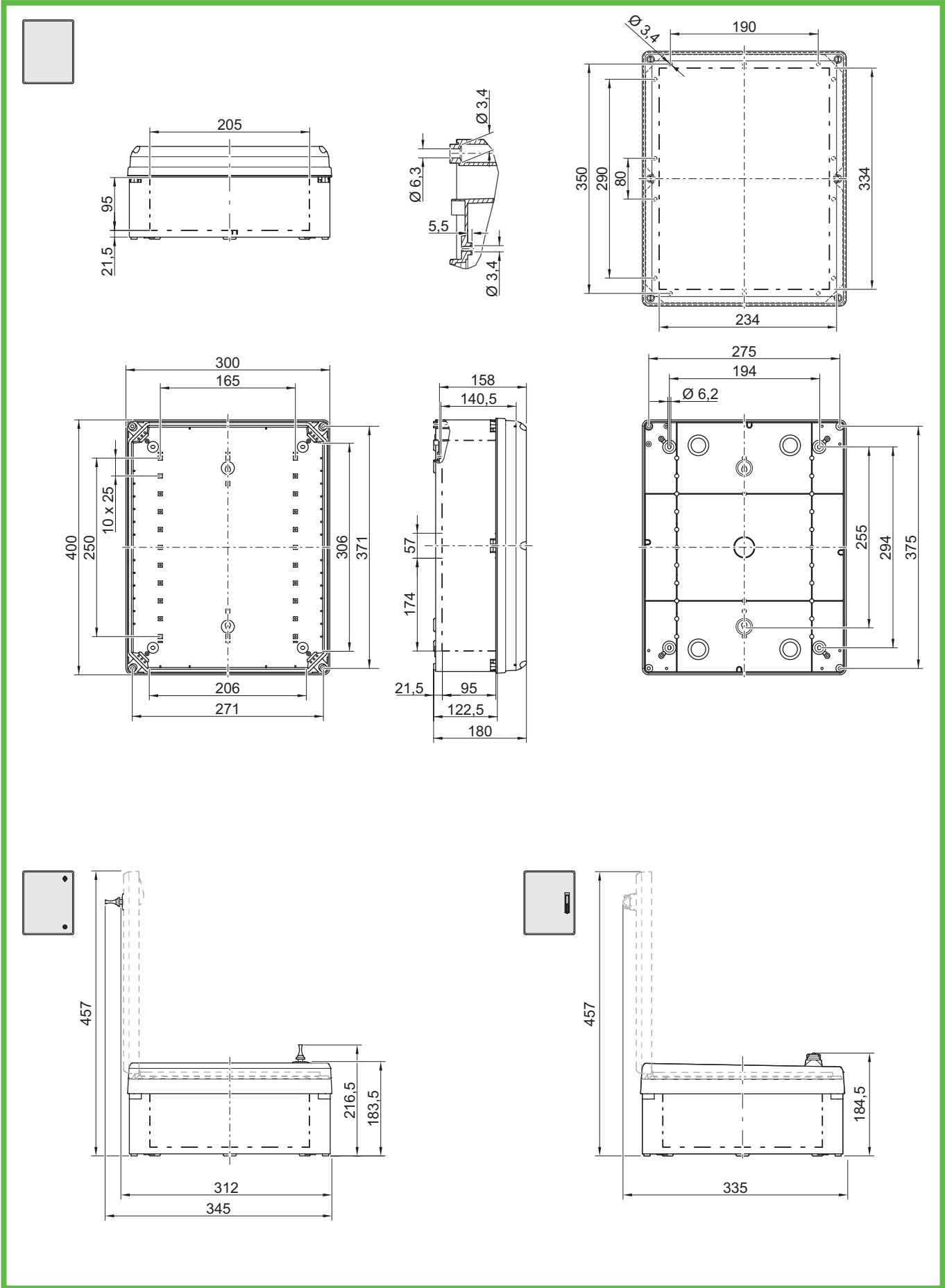


Fig. 71: GEOS 3040-18

GEOS 3040-22 Dimensioned drawing

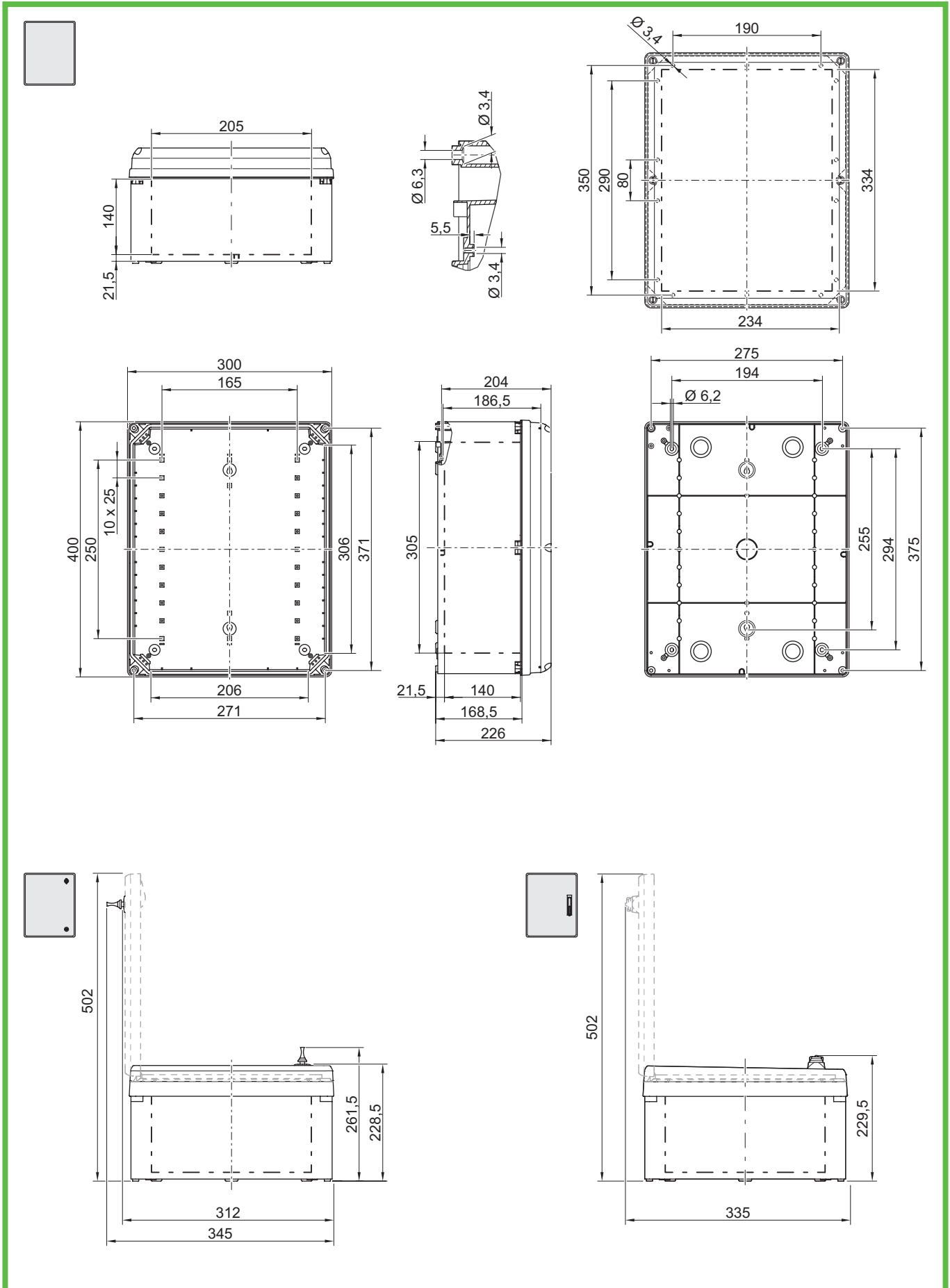


Fig. 72: GEOS 3040-22

GEOS-S 4030-18 Dimensioned drawing

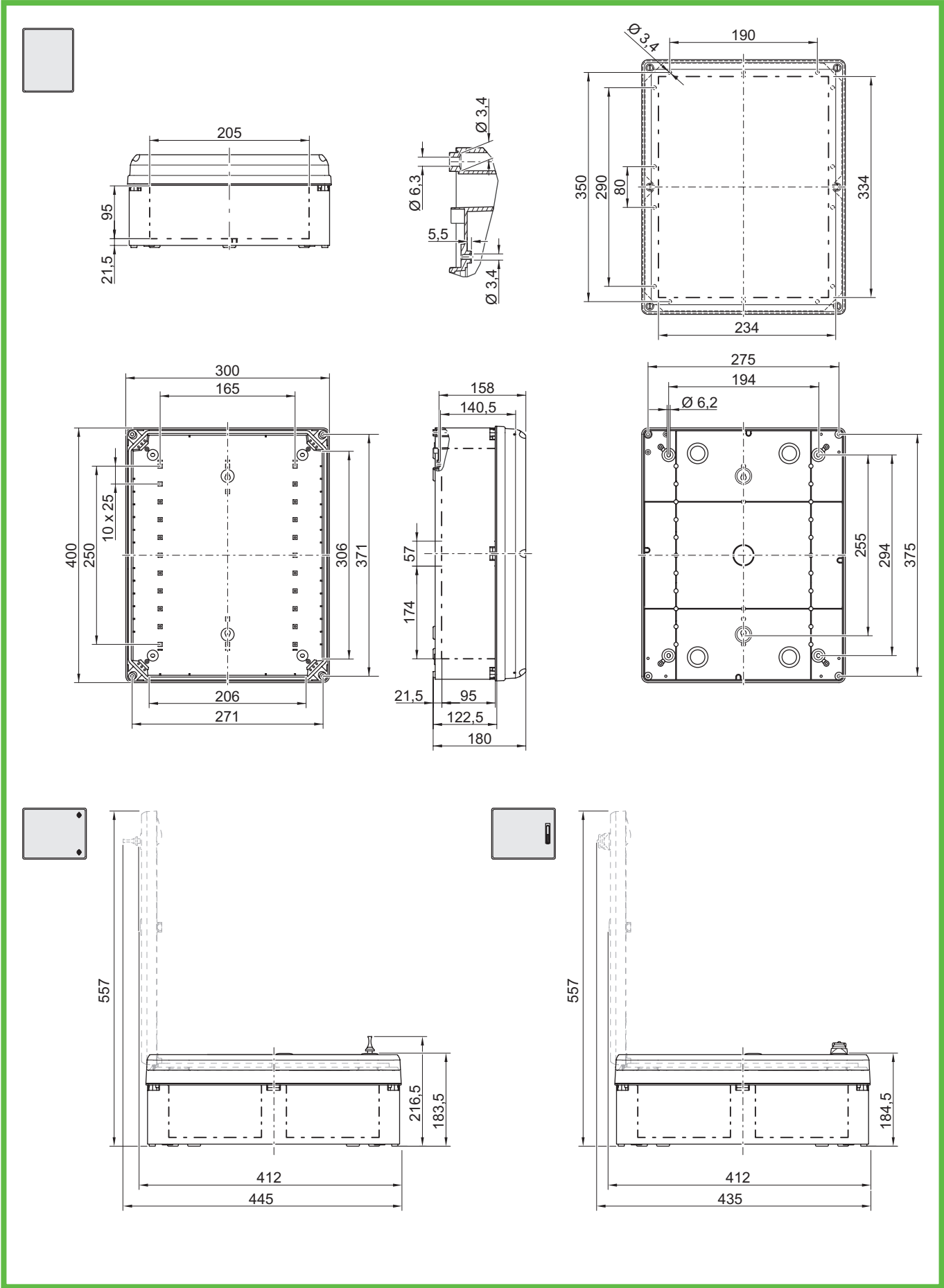


Fig. 73: GEOS-S 4030-18

GEOS-S 4030-22 Dimensioned drawing

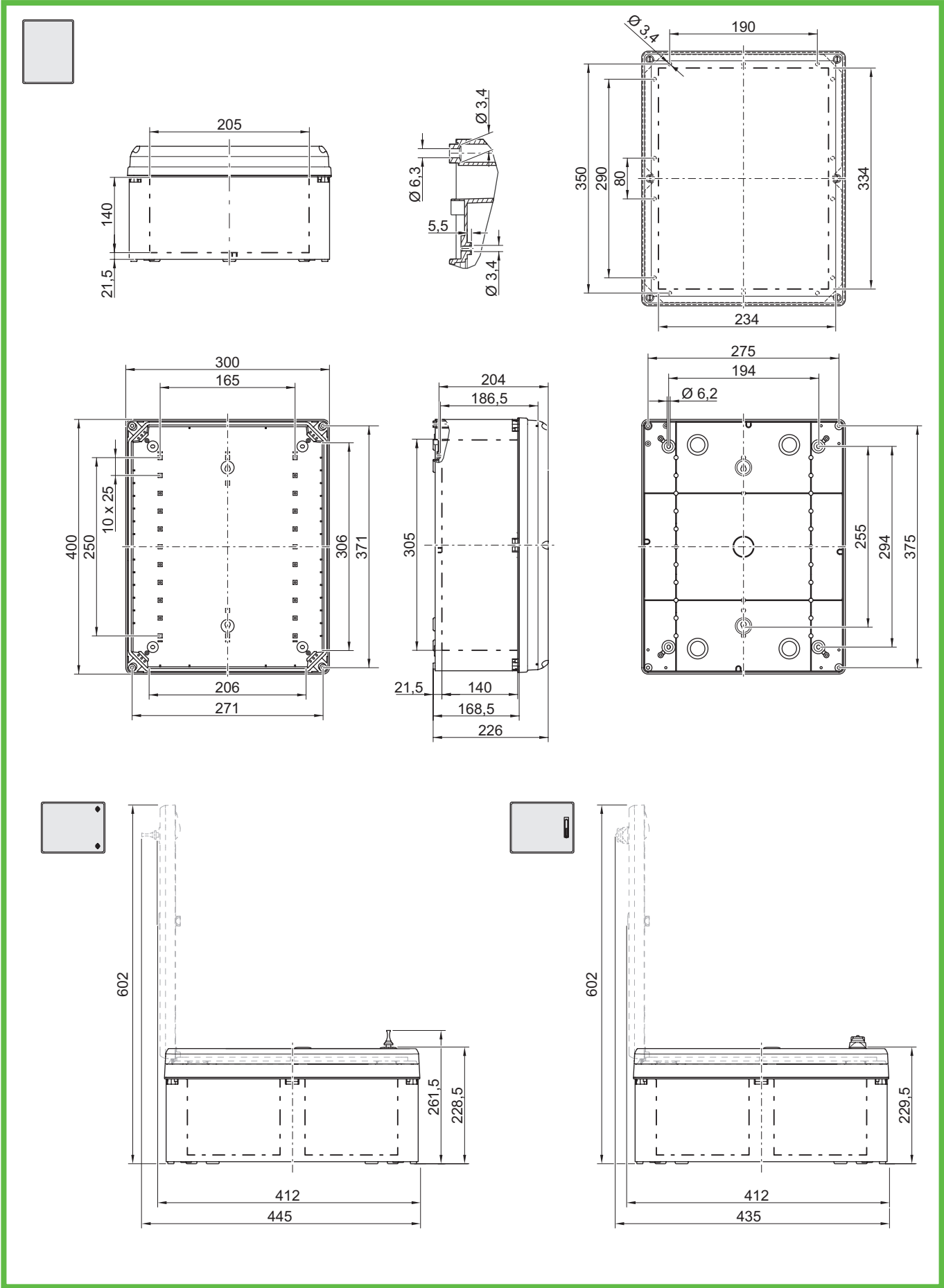


Fig. 74: GEOS-S 4030-22



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