Assembly instructions

Version 6/2012

TABLE OF CONTENTS

1 GENERAL

The F-serie NBS is an enclosure system for low-voltage switchgear and controlgear assemblies primarily intended for distribution, control, and automation centres to protect the equipment against mechanical impact, foreign material, dust, and humidity in indoor and outdoor installations. The enclosure also protects users from getting into contact with live components or current conductors.

The structure of the F-serie NBS system differs from the F-serie system primarily regarding the bottom and side plates. Both systems are type tested and certified according to Standards IEC/EN 61439-1 and IEC/EN 62208.

Table 1.1. Modular sizes of the F-serie NBS system.

Width [mm]	200, 300, 450, 600 and 750
Depth [mm]	80, 160, 250 and 320
Height [mm]	140, 175, 210, 280, 350, 420, 490, 560, 700, 840, 980, 1120, 1400, 1680 and 1960

The system is assembled using different types of screws that are presented in Table 1.2.

Table 1.2. Assembly screws of the F-serie NBS system.

Screw	Application
50059054 Plate screw DIN7981 4,8*9,5 or 50059052 Assembly screw M5*10	Assembly of base, frame plates, ends, side plates, mounting plates etc.
50059053 Hinge screw M5*8 Taptite	For fastening doors to front profiles/side plates
Plate screw 5,5*13 DIN7981	For fastening insulator holders to frame plate
Plate screw 5,5*25 DIN7981	For fastening insulator holders and busbar insulator ends to frame plate
50059069 Plate screw 4,8*25mm	For fastening end insulators and covers

The technical data of F-serie NBS system is shown in a table in Chapter 7.

2 ASSEMBLY INSTRUCTIONS

The F-serie NBS enclosure system is assembled starting from the enclosure base if applicable. The assembly of an enclosure without a base is started by joining the back plates and back profiles using screws or rivets. Preassembled basic frame packages can be fastened together using either screws or rivets.

When the basic frame is assembled, you can start installing the electric components into the cabinets by first installing the mounting plates. Another alternative is to add side plates, end plates, and end supports to the structure. Front profiles, intermediate supports, and dividers are used for delimiting the different fields in the horizontal direction, whereas intermediate covers and drip covers are used in the vertical direction.

2.1 Base

The assembly of base for the F-serie NBS system is started by joining with screws the back (3), front (4), and side (1) and intermediate plates (2) needed for the base arrangement as shown in Fig. 2.1. Assembly screws are used for joining these parts.

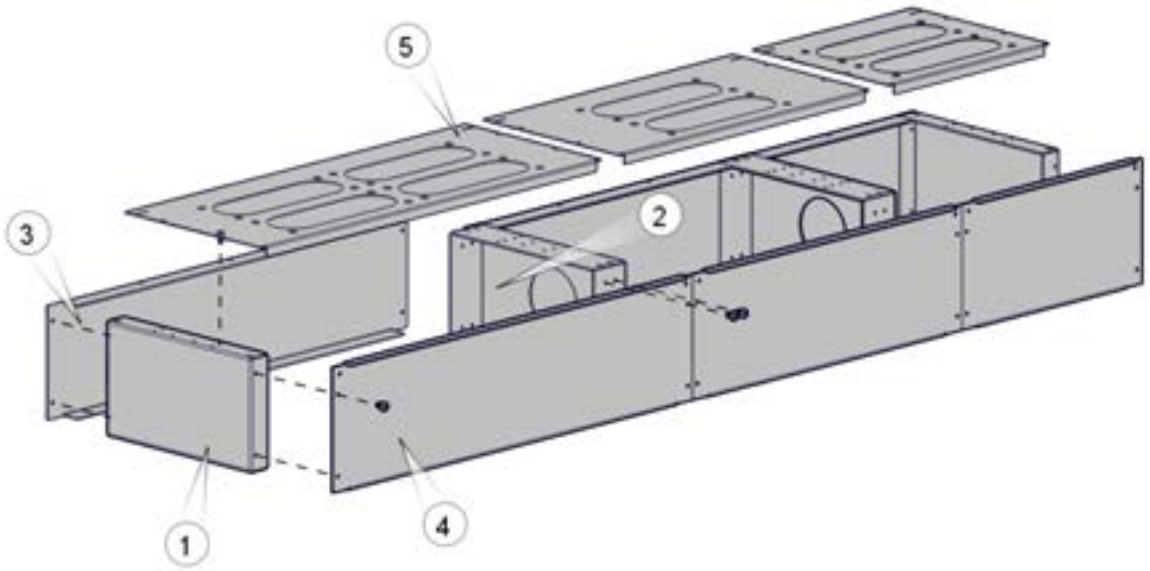

Figure 2.1. F-serie NBS system base assembly.

2.2 Back plates and back profiles

The back profiles (1), needed for mounting the mechanical parts, such as mounting plates, used when installing the electric components, are fastened to the back plates (2) using either rivets or screws as shown in Fig. 2.2. The length of back profiles is chosen according to the back plate length, excluding the end back plates (3) that are also shown in the Figure. By using end back plates you can leave the rear wall of the centre open for wiring, for instance.

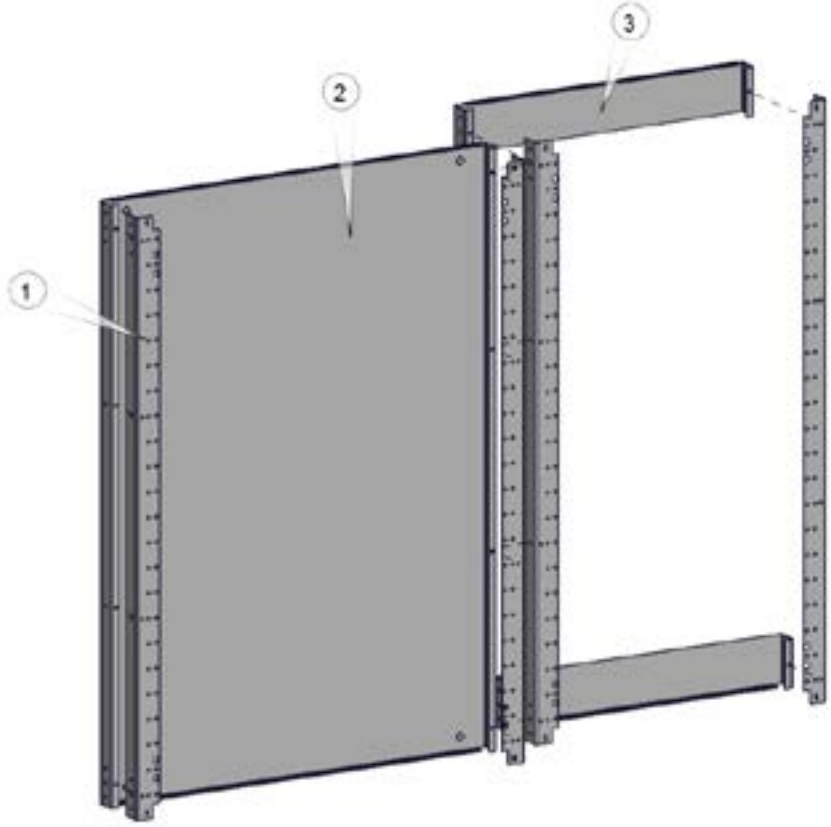

Figure 2.2. Assembly of back plates and back profiles.

2.3 Side and end plates

Side plates
Side plates can be fastened using either rivets or assembly screws. The side plates are fastened to the back frame consisting of back plates and the L-shaped profiles as shown in Fig. 2.3.

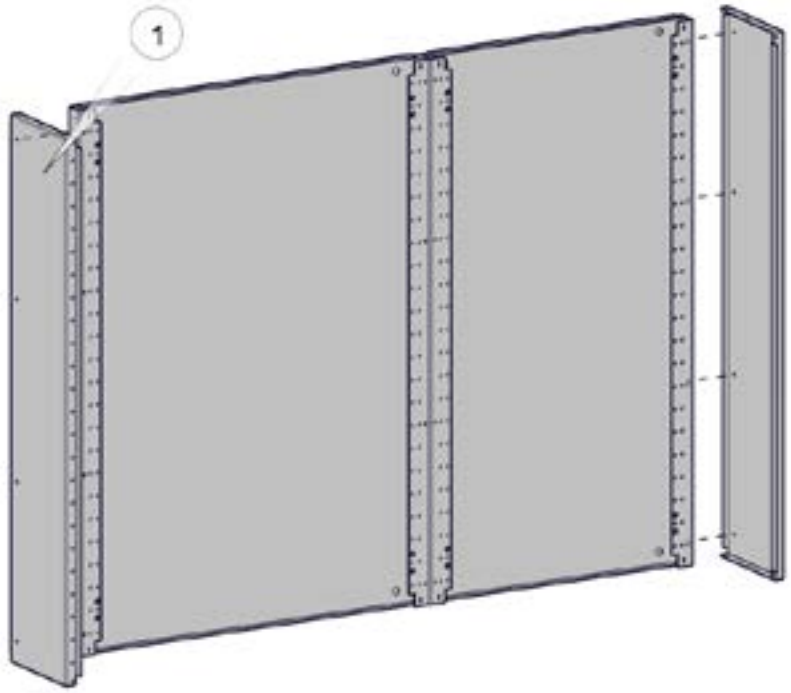

Figure 2.3. Assembly of side plates to back frame.

End plates
The end plates (1) are fastened with assembly screws to the frame structure made up of the back and side plates and back profiles after installing the end supports (2). The assembly hooks of the end supports are first inserted into the square holes in the back profiles and the supports are then turned horizontal to support the mounting of the end plates at the top and bottom of the structure as shown in Fig. 2.4.

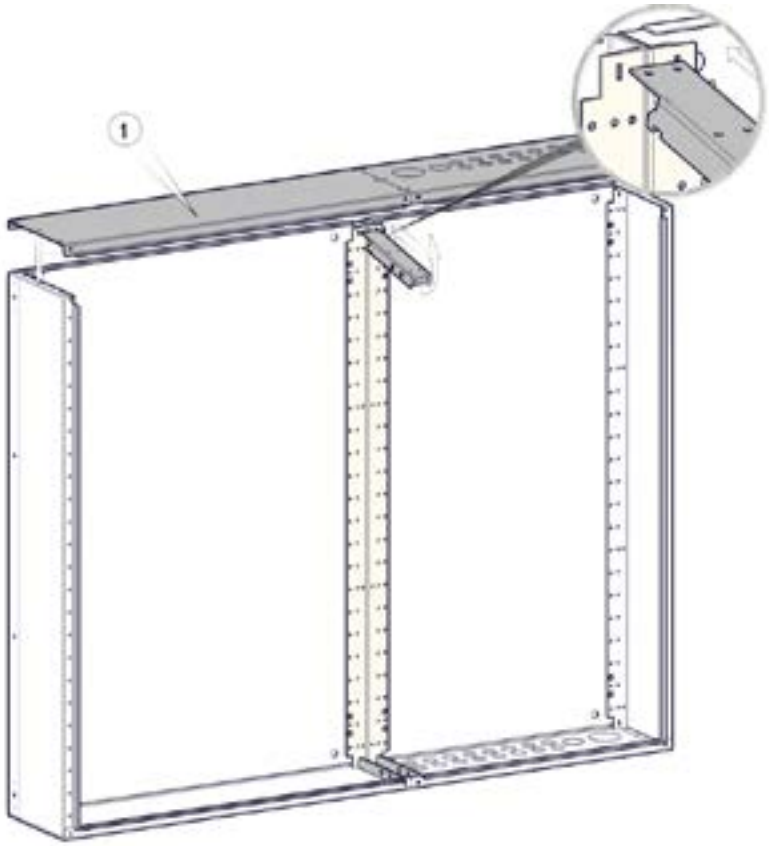

Figure 2.4. Mounting of end supports to back profiles. The end plates are fastened to the side and back plates using screws.

2.4 Front profiles, intermediate supports, and intermediate covers

The fields inside the centre are delimited using front profiles, intermediate supports and intermediate covers. Front profiles are fastened to end plates and intermediate supports using screws. The possible prefabricated knock-out blanks in the profile shall be removed at the intermediate supports.

By using a PVC intermediate cover you can improve the centre's internal division into sections. The intermediate covers also provide the IP20 touch screening defined for the interior parts of the centre. The comb section at the rear part of the intermediate cover can be used for wiring between fields, for example.

Figure 2.5 shows the assembly of front profiles, intermediate supports, and intermediate covers to the main frame.

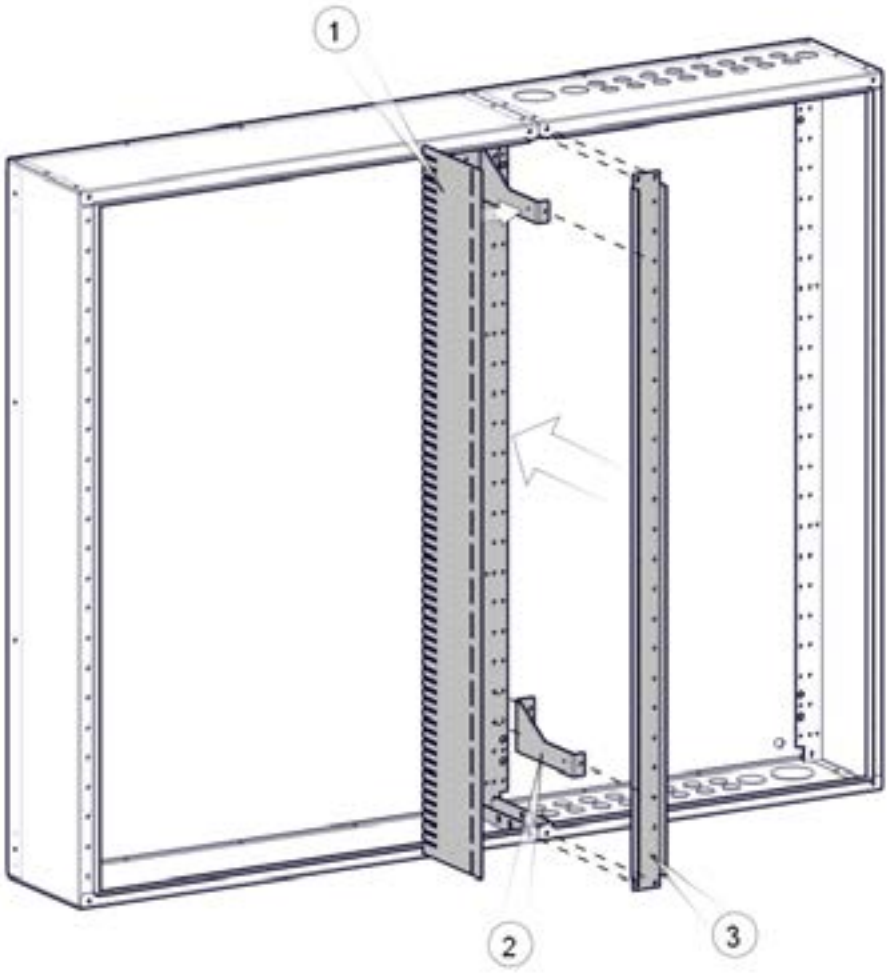

Figure 2.5. Fixing front profile with screws to end plate (and support) and to intermediate supports. The intermediate cover is fixed to the intermediate supports.

2.5 Intermediate horizontal profiles and drip covers

Drip covers divide the assembled centre in the vertical direction into cells for electric components. In addition to drip protection, the drip covers also act as touch screens and correctly installed they provide the internal parts with Class IP20 touch screening.

Figure 2.6 a) shows how the drip cover rear part (1) is installed to the L profiles. The front part of the drip cover (2) and the horizontal intermediate profile (3) are fastened with screws as shown in Fig. 2.6. b).

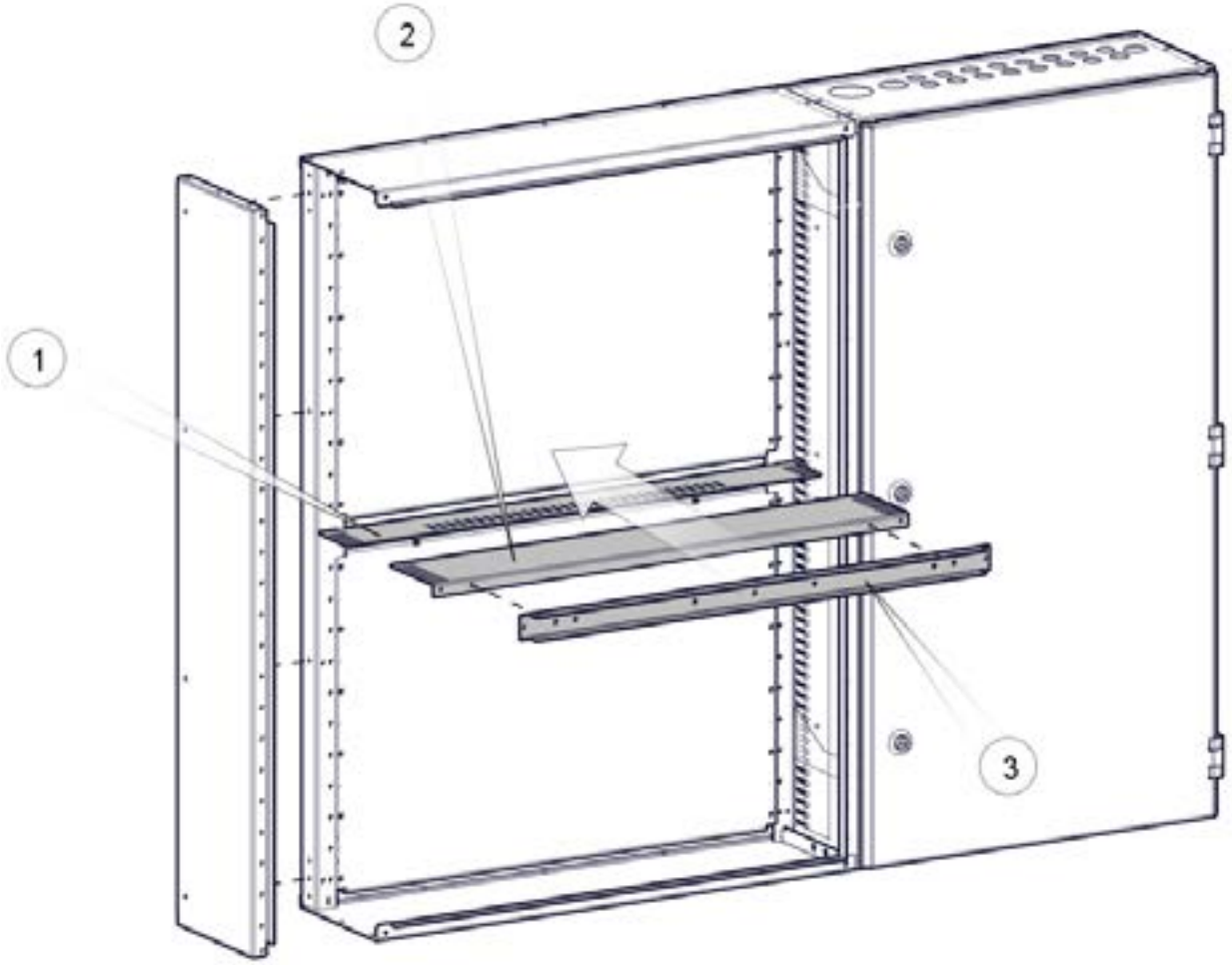

Figure 2.6 a) Drip cover rear part is fixed with screws to L profiles.

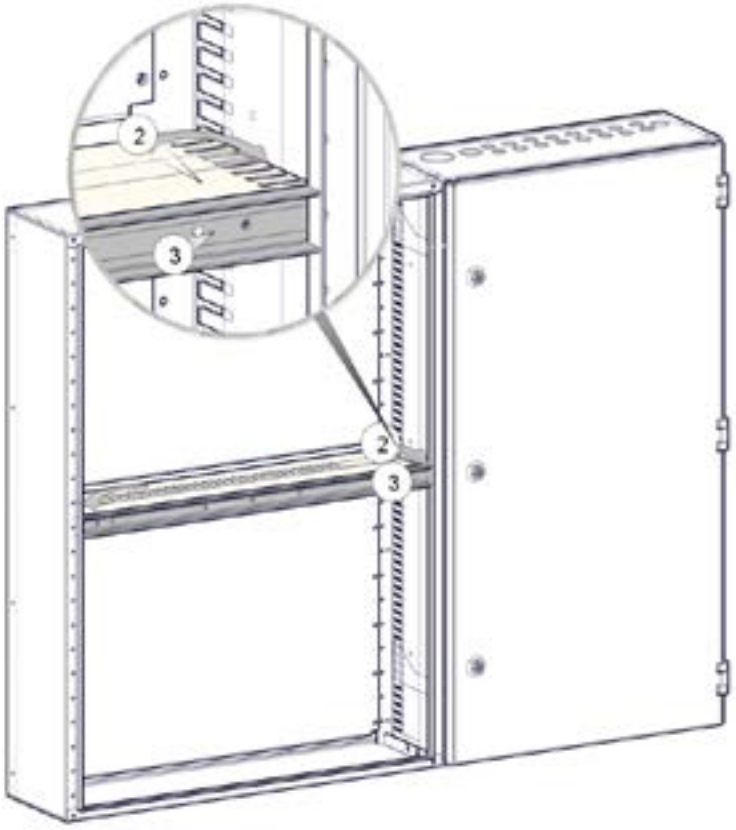

Figure 2.6 b) The drip cover front part (2) is fastened with screws to the front profile and the horizontal intermediate profile (3) that is fixed to the side plate.

Dividing intermediate profiles
Dividing intermediate profiles can be used, for example, for dividing a 600 mm wide device field into two fields. Dividing intermediate profiles are fastened in the same way as horizontal intermediate profiles. A front profile that divides the field space is installed between two dividing intermediate profiles as shown in Fig. 2.7.

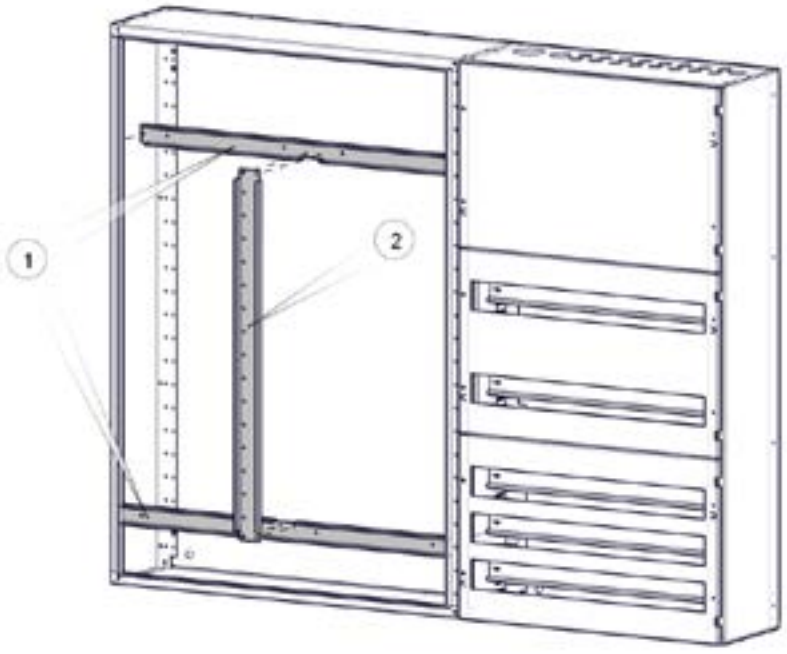

Figure 2.7. A front profile that divides the field space is installed between two dividing intermediate profiles.

2.6 Mounting plates

The mounting plates (1) for electric components are fixed to the back plate L profiles using assembly screws as shown in Fig. 2.8.The mounting plates of both the F- and the E-serie systems can be used in the F-serie NBS system. The mounting plates can be installed before the side plates of the system and this way provide ample room for mounting the electric components.

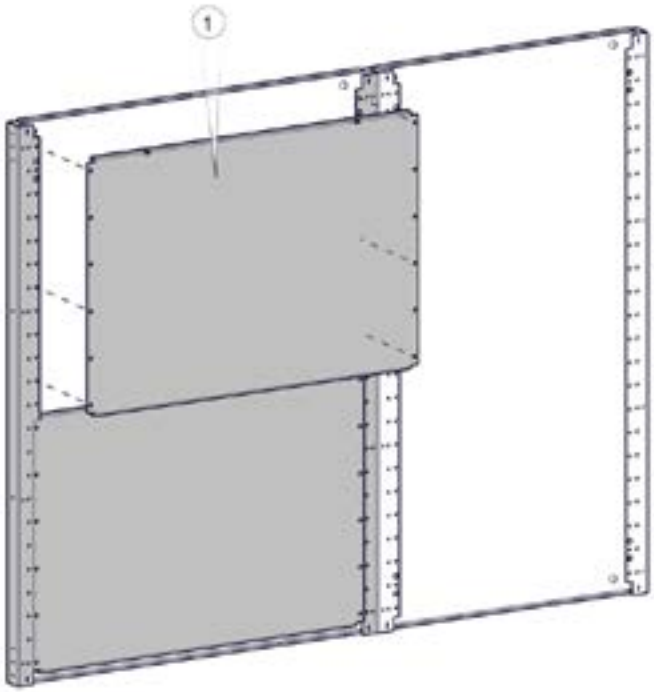

Figure 2.8. The mounting plates of the F-serie NBS system can be installed before the side plates.

2.7 Busbar insulator holders and busbar insulators

The busbar insulator holders (1) are used for installing busbars in the cell centre. The busbar insulator holders are fastened to the L profile and the side plates/front profiles using assembly screws as shown in Fig. 2.9.

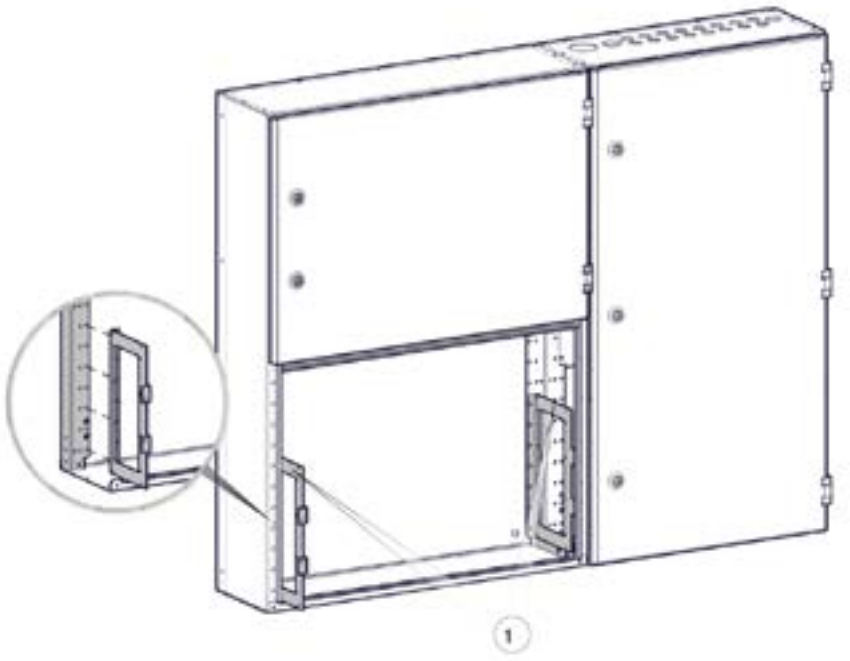

Figure 2.9. Busbar insulator holders are installed between L profiles and side plates/front profiles.

The busbar insulators are fastened to the busbar insulator holders (3) with screws. For the ends of possible power busbars in an enclosure, busbar insulators (6) and busbar end insulators (1) are installed to insulate the busbars from the metal frame structures as shown in Fig. 2.10.The busbar insulators are fastened with either 4.8x9.5mm plate screws or M5x10 assembly screws and the busbar end insulators with, for instance, 5,5x25mm screws.

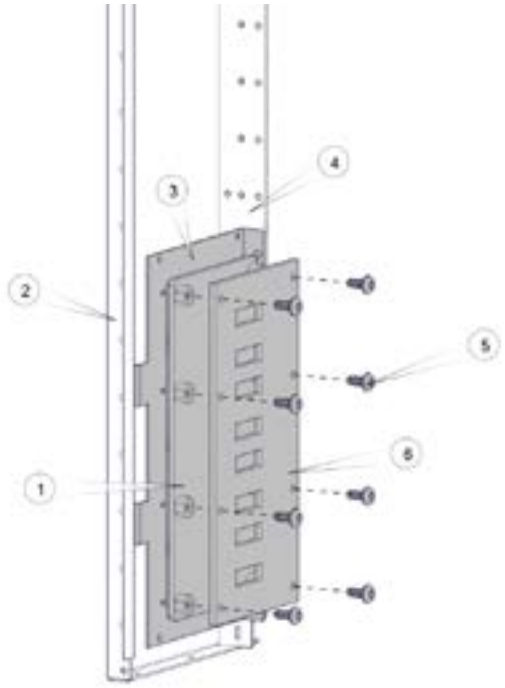

Figure 2.10. Installing busbar end insulators and busbar insulators to the end of power busbar system.

2.8 Doors

The doors for the F-serie NBS system have preassembled hinges with an opening angle of 160 degrees. The doors are mounted to front profiles or side plates depending on the desired opening direction, see Fig 2.11.

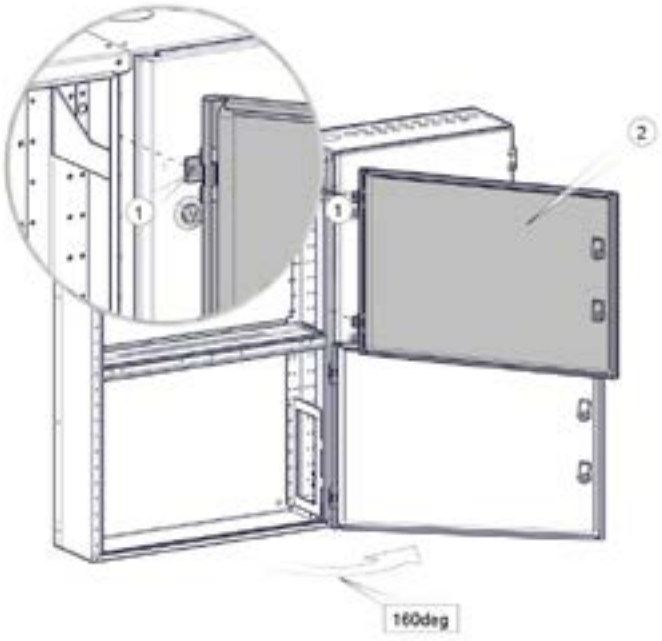

Figure 2.11. Doors are mounted to front profiles or side plates. The opening angle for all doors is 160 degrees.

2.9 Intermediate cover system

The intermediate cover system consists of intermediate cover mounting brackets, mountings, and covers. Using the intermediate cover system it is easy to have components with DIN rail mounting neatly behind a door.

Intermediate cover mountings
Intermediate cover mountings (1) are first fastened with screws to intermediate cover mounting brackets (2). Then this mounting set is fastened with assembly screws to the L profile (3) as shown in Fig. 2.12.

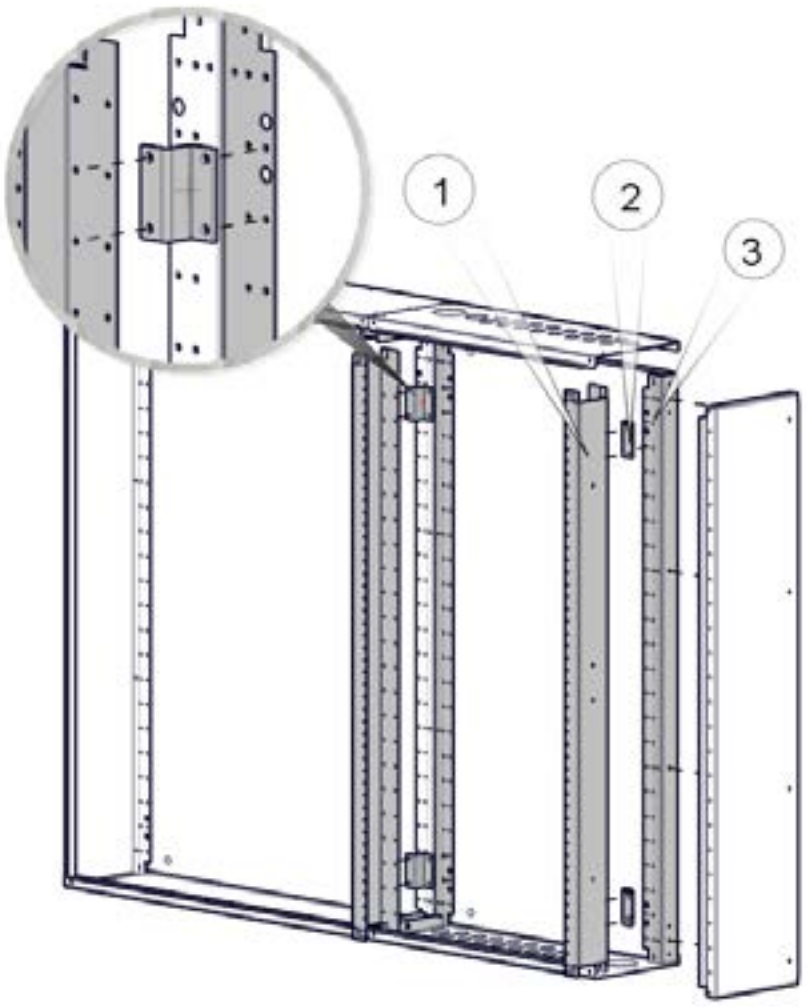

Figure 2.12. Intermediate cover mountings and their brackets are assembled together and the assembly is then fastened with screws to the L profiles.

The 17.5 mm spacing of holes in the intermediate cover mountings allows an almost infinite number of different intermediate cover combinations.

Intermediate covers
Intermediate covers (3) are grouped in the desired order to the intermediate cover field and fastened to intermediate cover mountings using intermediate cover hinges (2). At the end(s) of intermediate cover fields it is advisable to use end intermediate covers (1) for covering terminal strips, for instance. Installation of intermediate covers is shown in Fig. 2.13.

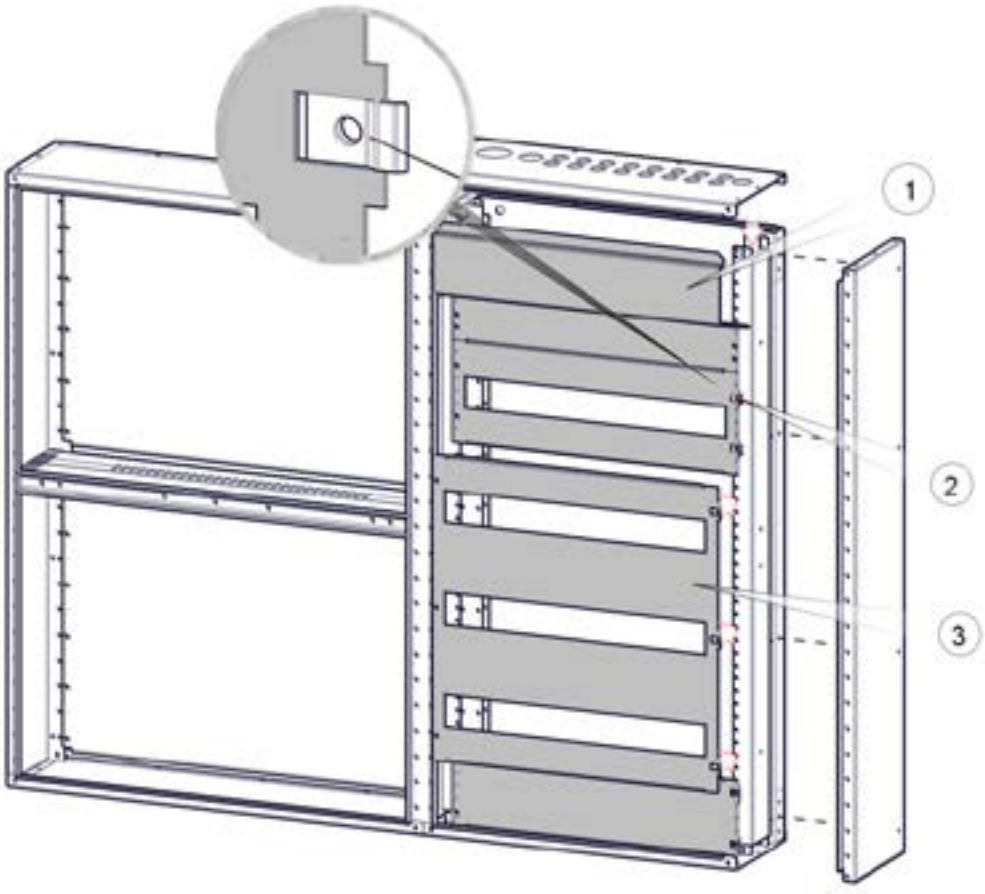

Figure 2.13. Intermediate covers are fastened to intermediate cover mountings using intermediate cover hinges and assembly screws.

Installation depth
The installation depth of the intermediate cover system is designed suitable for modular components with DIN rail mounting. The installation depth for modular components is approx. 47.35 mm from DIN rail (1) surface to the rear face of intermediate cover (2). The distance between the intermediate cover surface and the front surface of the door (3) is approx. 72.4 mm as shown in Fig. 2.14.

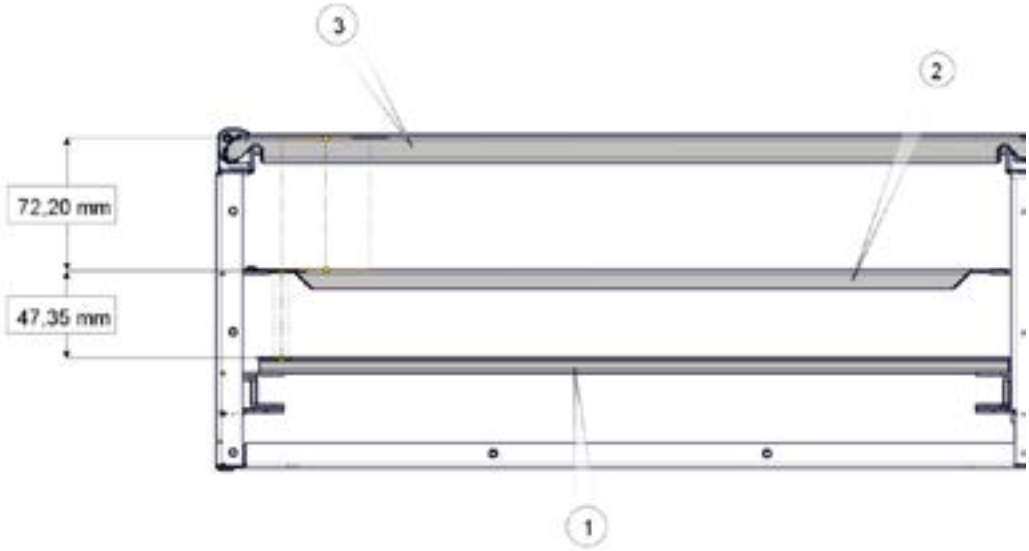

Figure 2.14. Sectional view of intermediate cover structure.

2.10 Covers, installation rails and spacers

Covers
The F-serie NBS covers (1) are fastened with either 4.8x25mm plate screws or hinges on one side. The covers can also be sealed using the sealing lug (2) of the cover. Installation of covers to the frame structure is shown in Fig. 2.15.

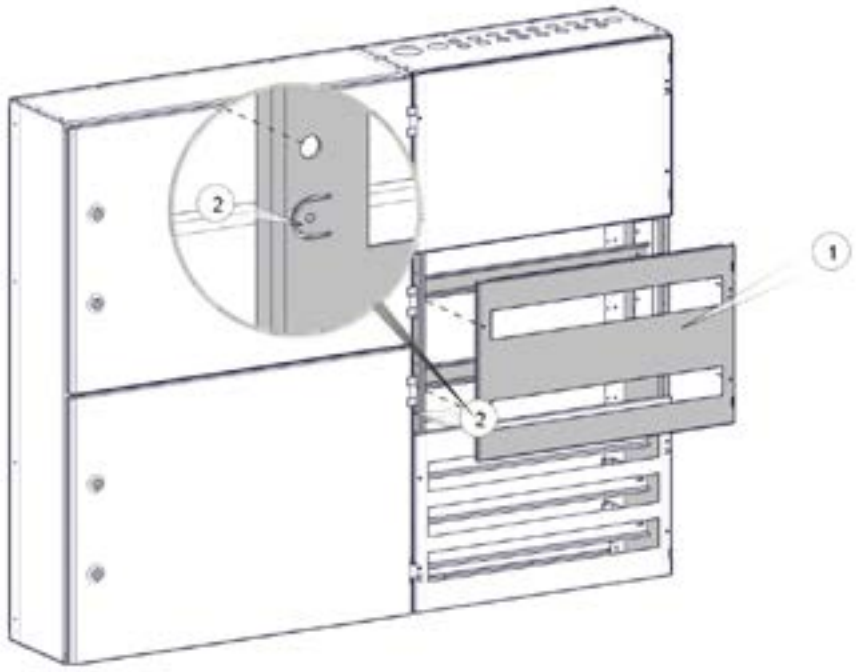

Figure 2.15. Installing covers to frame structure. The cover can be fastened using screws or screws and hinges. The cover can also be sealed.

Installation rails
Spacers and installation rails are used for components with DIN rail mounting. Installation rails (2) are fastened with screws to the front part of the side plate and front profile as shown in Fig. 2.16 a). The installation rails are dimensioned so that they fit under 280 mm and 420 mm high covers. Figure 2.16 b) shows a sectional view of an application of installation rail (2) and DIN rail (6). The other parts in Fig. 2.16 b) are side plate (4), cover (5), and front profile (7).

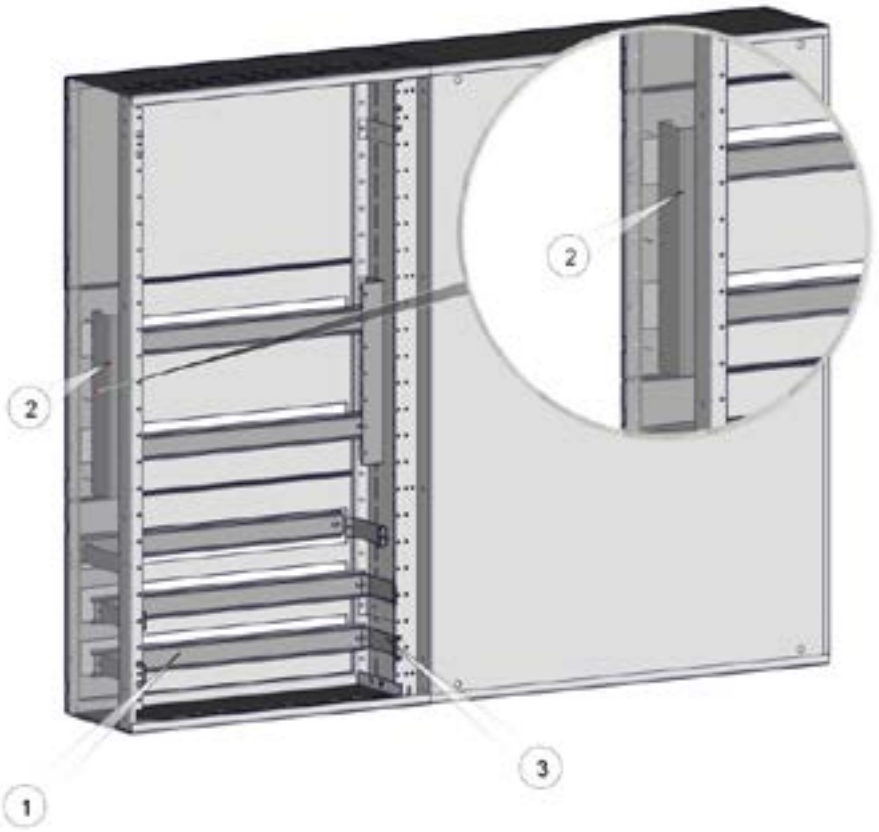

Figure 2.16 a) Fastening installation rail for DIN rails to side plate and front profile.

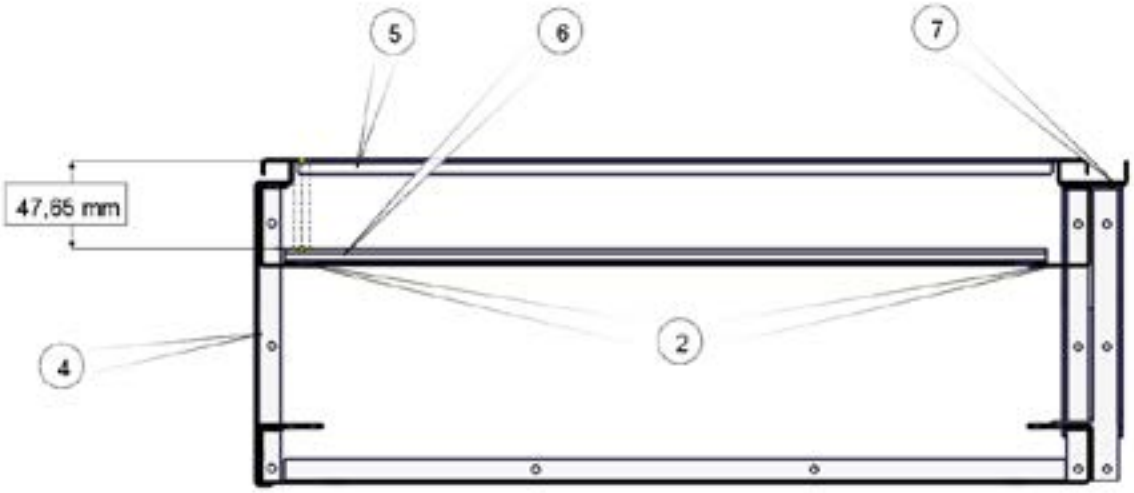

Figure 2.16 b) Sectional view. The distance between DIN rail (6) surface and the back of the cover is 47.65mm.

Compared with spacers, installation rails provide better support for DIN rails and components, but with spacers it may be possible to shorten installation times.

Spacers
By using spacers, you can set the DIN rail distance from the cover suitable to the components. With spacers it is also possible to bring, for instance, mounting plates forwards from the L profile. Figure 2.17 a) shows the installation of spacers (3) and DIN rails to the L profile. Figure 2.17 b) is a sectional view of the use of spacers showing spacer (3), DIN rail (1), and cover (4).

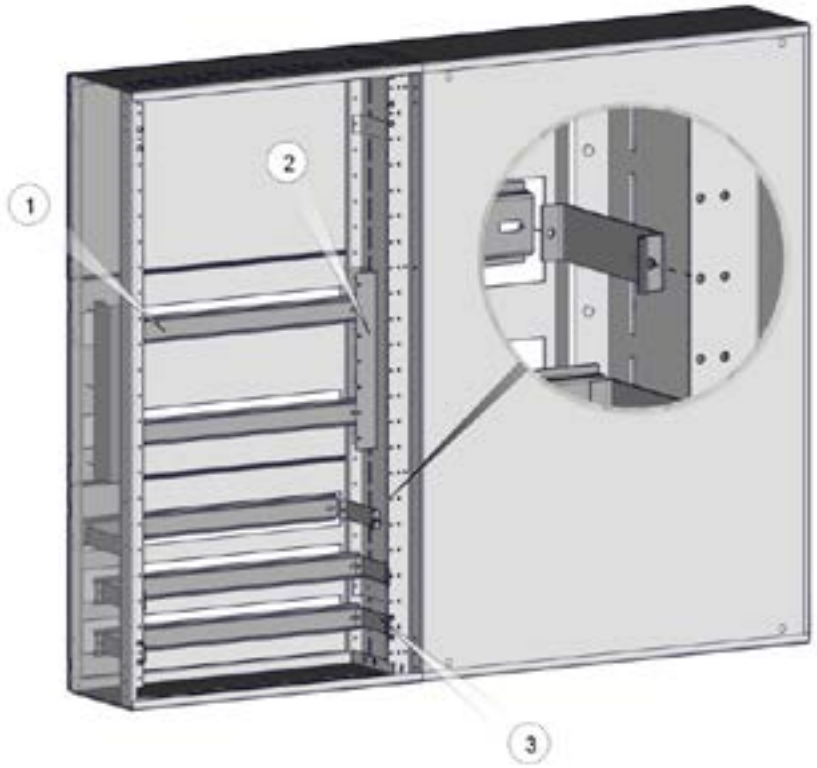

Figure 2.17 a) Spacers are fastened to L profiles, and DIN rails to spacers.

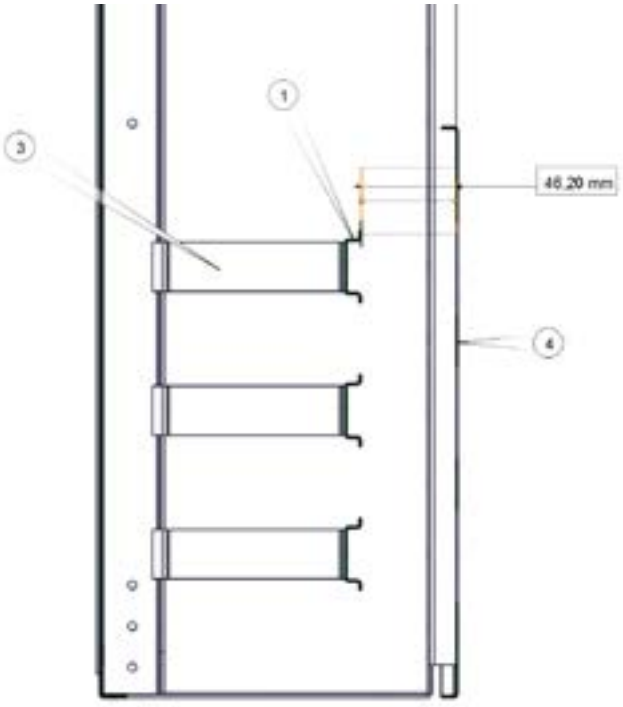

Figure 2.17 b) Sectional view of spacers and DIN rails. The distance between DIN rail surface and the back of the cover is 46.2 mm.

2.11 Touch and finger screens

The use of touch and finger screens is similar to intermediate covers. The DIN rails used for mounting components and the touch screen brackets (2) are fastened in front of spacers. Touch screen plates (1) is fastened with screws or the tabs on the brackets as shown in Fig. 2.18.

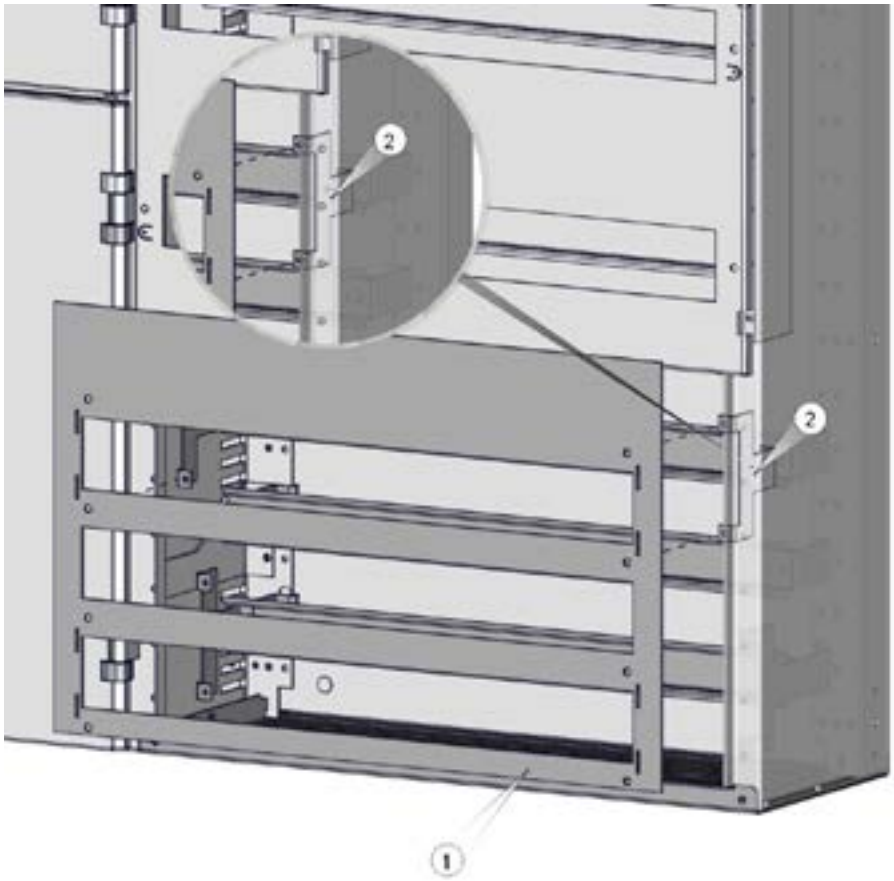

Figure 2.18. Installing touch screen plates. Touch screens (1) are fastened using brackets (2) positioned in front of the DIN rails.

2.12 Cover door system

The cover door system can be used, for instance, for easily converting an electric centre enclosure originally provided with touch screening into an enclosure with doors. The cover door system is a frame structure that consists of the actual doors (1), their end pieces (3) and side plates (2), and the corner pieces that reinforce the ends in enclosures with multiple fields. In enclosures with multiple fields you also need latch counterpieces (4) for locking the doors.

The structure of the cover door system is shown in Fig. 2.19.

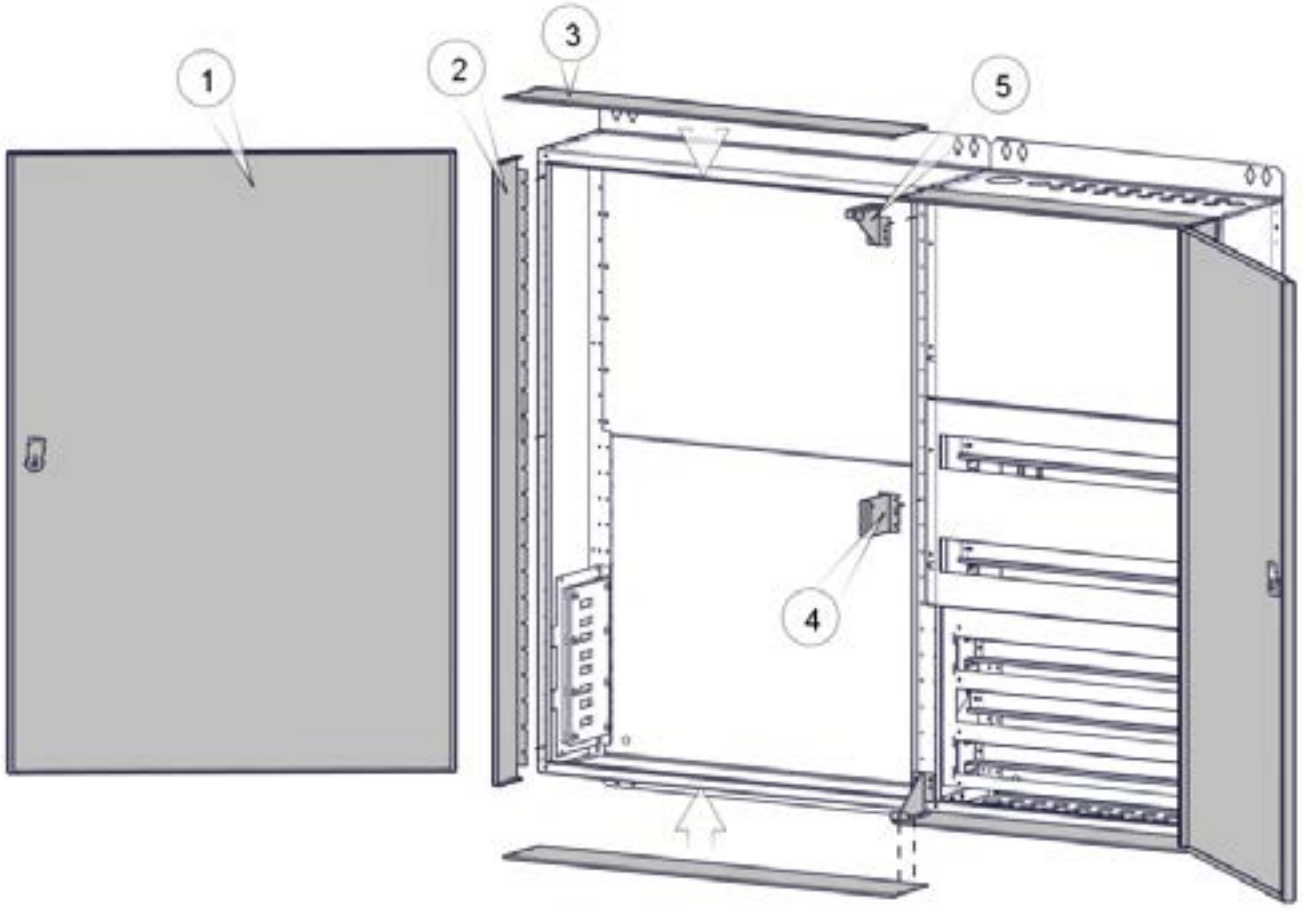

Figure 2.19. The cover door system is a frame for installing doors, for instance, to enclosures originally provided with touch screening.

2.13 Special parts

Fixing rails
Fixing rails (2) can be used for fixing a cell centre at the top and bottom to a wall or, for instance, to raising beads. Fixing rails cut to appropriate length is fastened to the enclosure end with screws as shown in Fig. 2.20. If necessary, fixing rails can be lengthened using extensions (1).

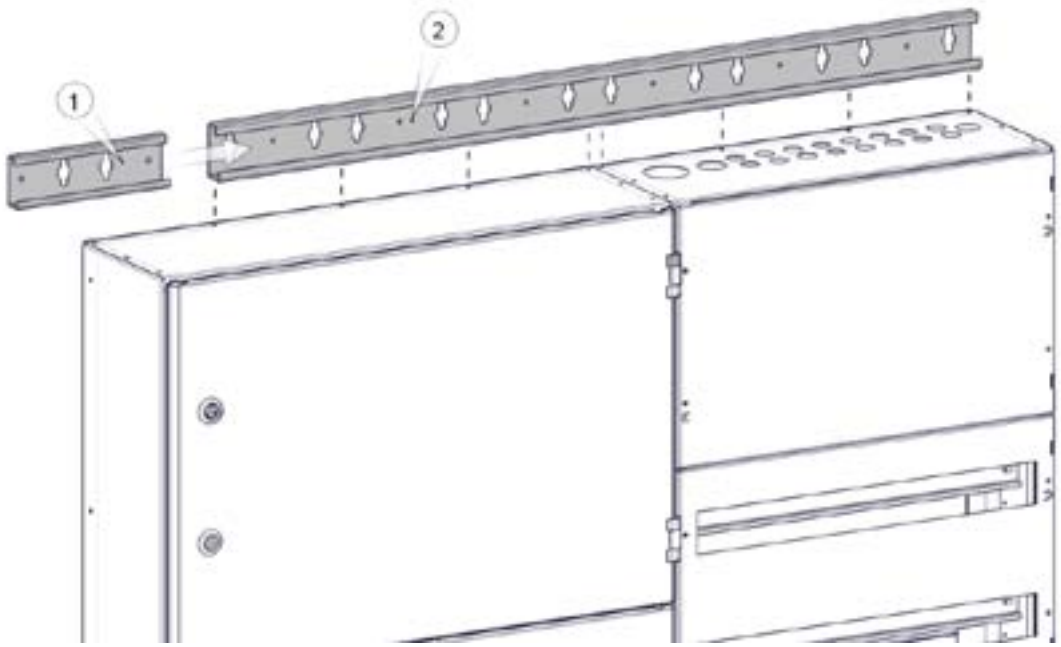

Figure 2.20. Fixing rails are fastened to end plates. Rails can be connected using extension pieces.

Attaching brackets
Attaching brackets are used for the same purposes as fixing rails. Attaching brackets (1) are fastened to the enclosure top and bottom ends with assembly screws. Unlike fixing rails, the attaching brackets are mechanical parts with modular dimensions.

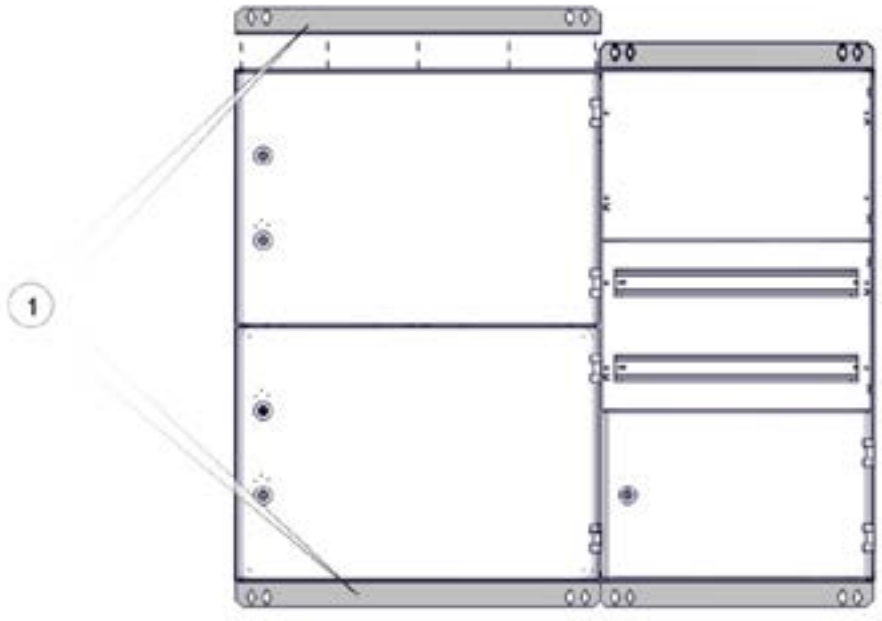

Figure 2.21. Attaching brackets are fastened with screws to both ends of enclosure.

Foot balks
Moving an F-serie NBS enclosure can be done by using a transport stand specially designed for this purpose, and it can also be used when assembling the centre. The mechanical parts of the centre are fastened to the transport stand using, for instance, foot balks (1) that can also be used for proving a clearance to the wall.

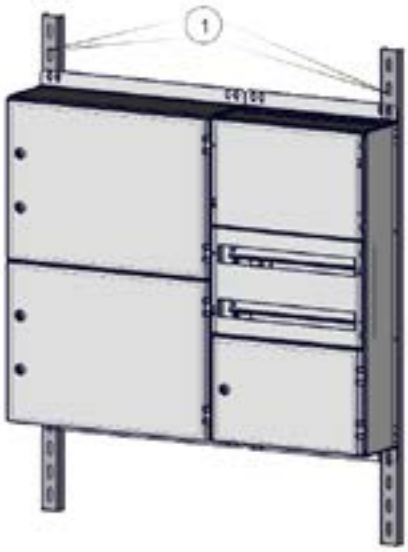

Figure 2.22. Foot balks are fastened to attaching brackets or fixing rails. Foot balks can also be utilized, for instance, when the centre is assembled.

DIN rail brackets
A pair of DIN rail brackets (2) can be used for mounting single DIN rails (1). The brackets can be installed to side plates or front profiles, for instance. The rail is pushed into the slot in the DIN rail bracket as shown in Fig. 2.23.

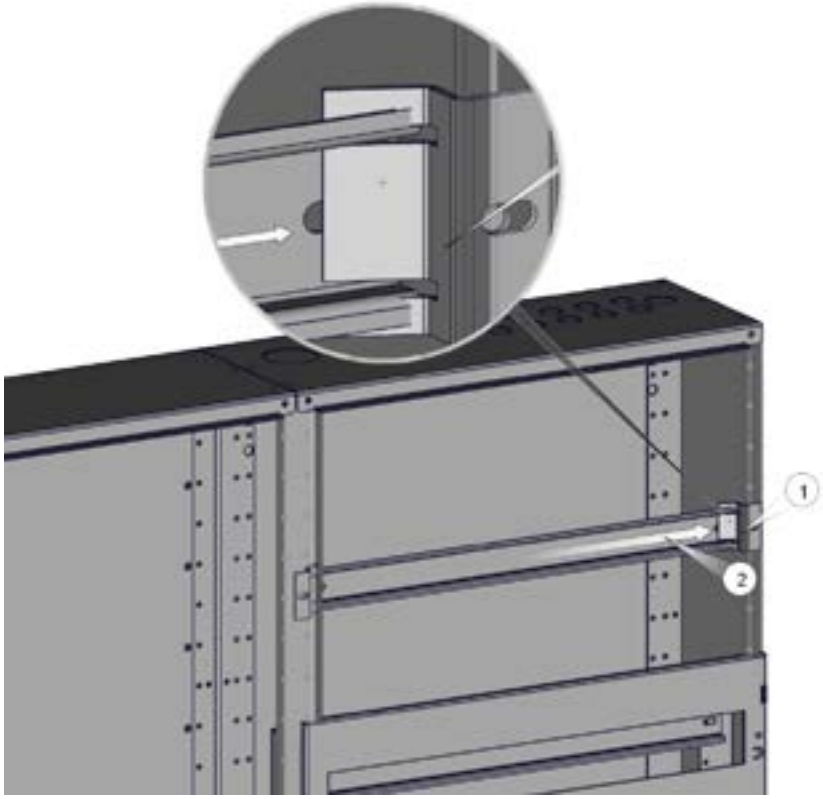

Figure 2.23. DIN rails are installed by pushing the rail into the DIN rail bracket.

Vertical DIN installation rails
With vertical DIN installation rails (2) DIN rails (1) can be installed vertically in, for instance, the terminal strip space as shown in Fig. 2.24. Vertical DIN installation rails can also be used for mounting components in the components compartment when applicable.

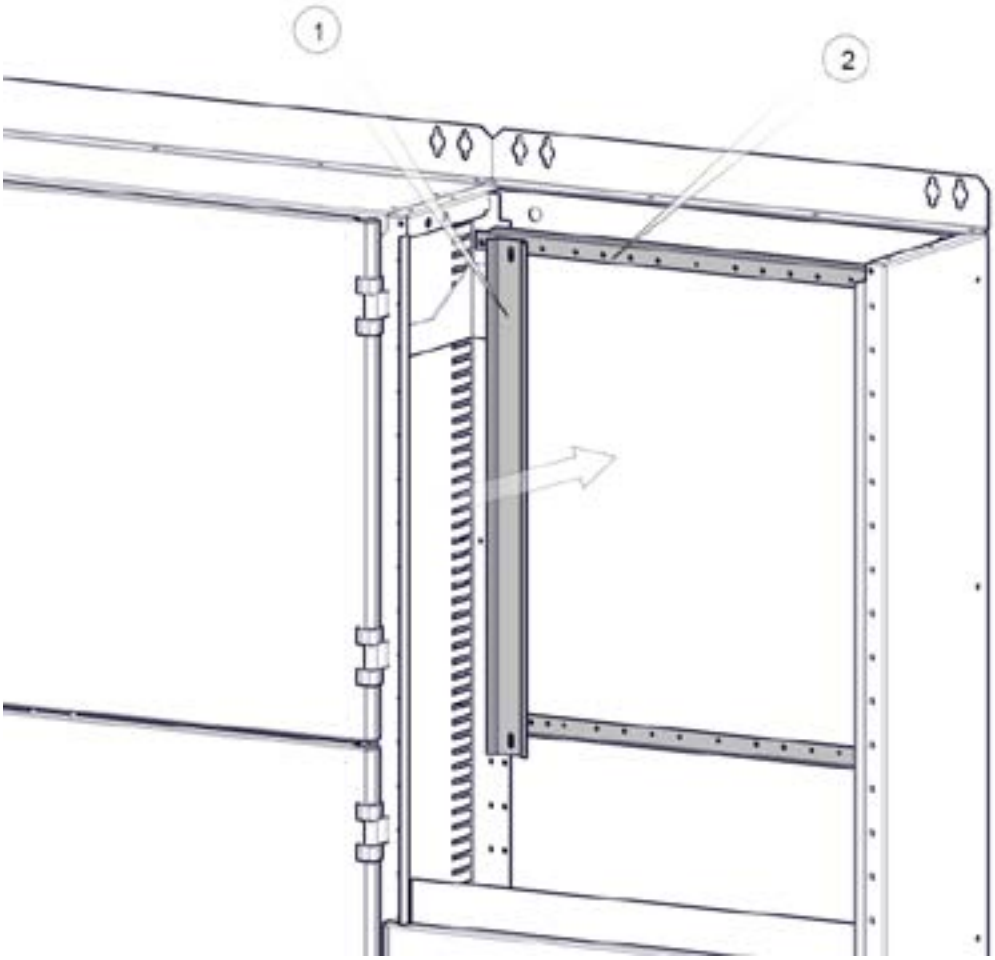

Figure 2.24. With vertical DIN installation rails, DIN rails can be mounted vertically.

3 SEALING

F-serie NBS cell centres can be built to meet protection class IP55 requirements by using suitable strips and sealants at the joints. Without the use of sealing strips or sealant the protection class is IP20-IP30 depending on the perforations in the front profiles and horizontal intermediate profiles.

3.1 Protection classes

Protection class IP40
To reach protection class IP40, sealing strip or sealant is used for sealing the joints between fields and the ends in the enclosure top, and unperforated front profiles/side plates are used.

Protection class IP34
All plate joints shall be provided with 0.8*20 mm sealing strips and the ends of the intermediate profiles shall also be sealed. Sealant is used for sealing the middle joints of the enclosure top and the front side corners of the end plate against the door sealing strip. The edges of possible C flange blanks on the end plates shall be sealed with sealant.

Protection class IP44 (spray protected)
In addition to the above sealing procedures, to reach class IP44 protection, sealant shall also be applied to the vertical joints of the back plates.

Protection class IP55 (watertight)
To reach class IP55 protection, either gluing putty or silicone sealant shall be applied to all joints in parts surrounding the frame structure (including the base). An at least 1.5 mm thick and wide strip of sealant shall be applied to the joint surface so that sealant is squeezed between the plates when the fastening screws are tightened.

The points where sealant shall also be applied are the door openings, i.e. the joints between the side plates and front profiles as well as end plates and intermediate horizontal profiles, see Fig. 3.1.

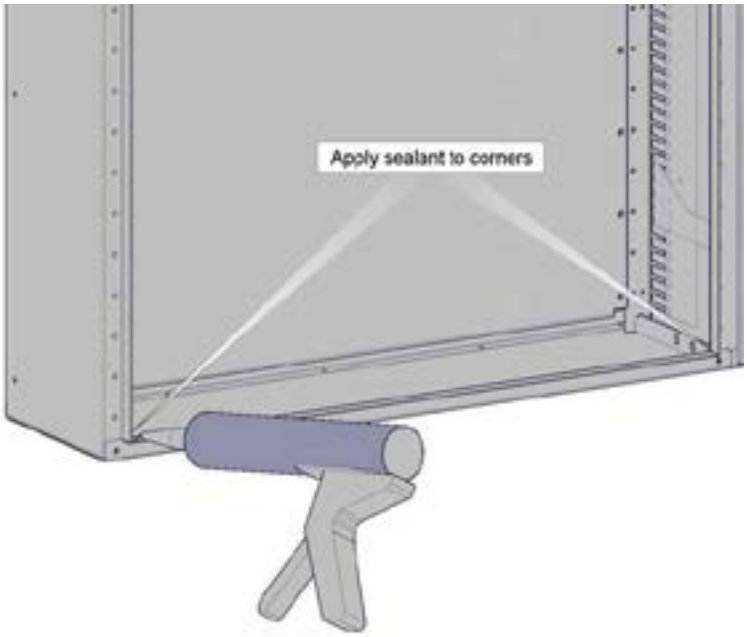

Figure 3.1. Applying sealant to joints between end plates and intermediate horizontal profiles as well as side plates and front profiles.

3.2 Sealing of cell centre parts

In addition to the requirements in Chapter 3.1, the sealing of F-serie NBS centre parts is presented in the following Chapters

Back plates
Sealing strips (2) shall be glued to the long sides of the back plates (1) as shown in Fig. 3.2.

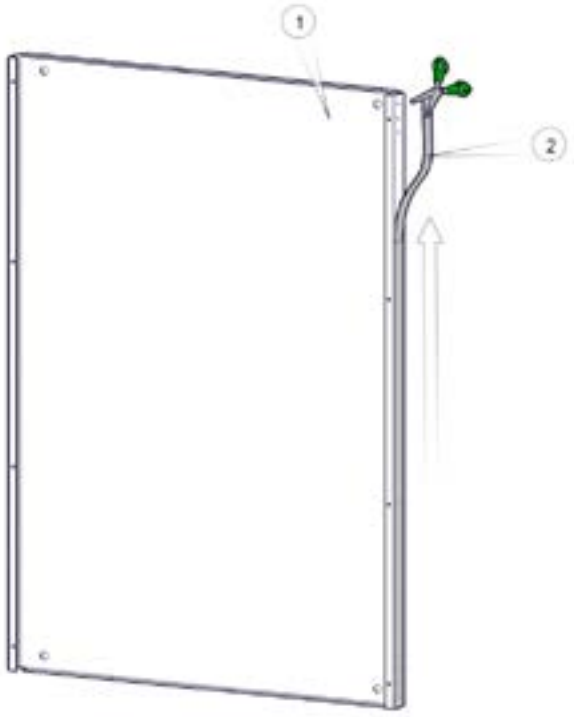

Figure 3.2. Sealing long sides of back plate for F-serie NBS cell centre with sealing strip (50020040 Joint sealing strip 0.8*20 mm).

End plates
Of the end plates, the short sides and the rear end facing the back plate shall be sealed according to Figure 3.3.

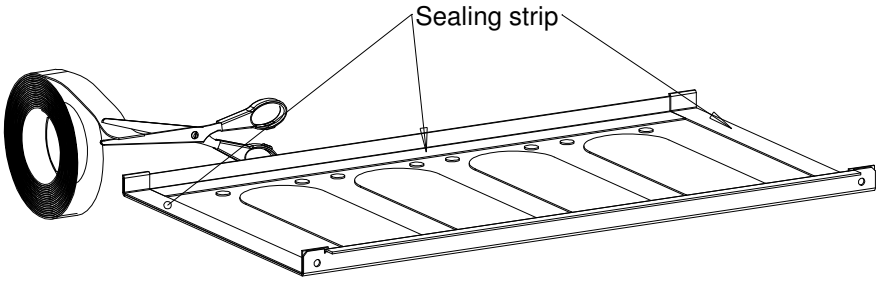

Figure 3.3. Sealing of end plates. Sealing strip is attached to the short sides and rear of the end plates.

Side plates
On the side plates (2), sealing strip is attached to the sides facing the back plate and the L profile as shown in Fig. 3.4.

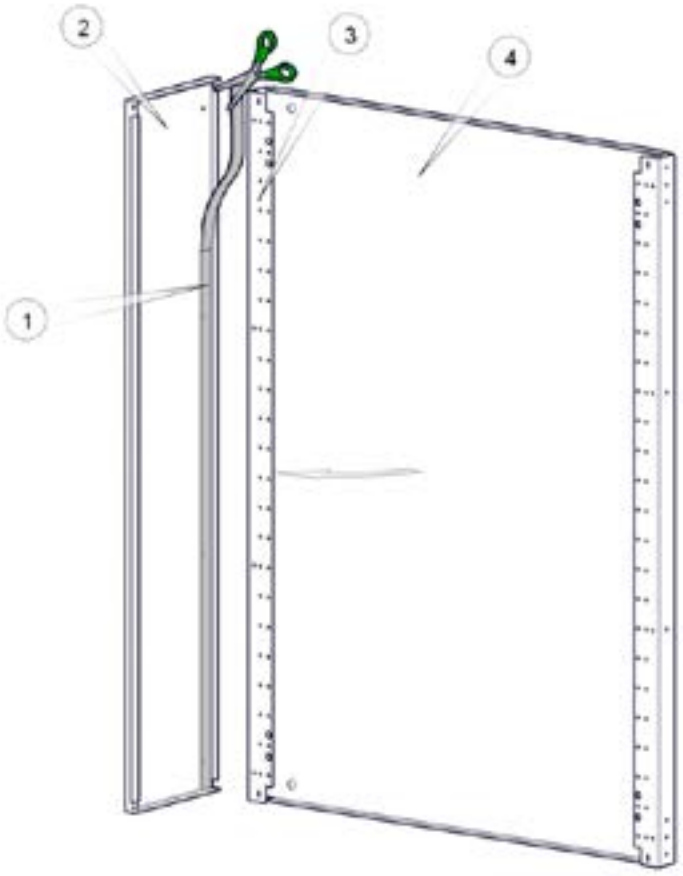

Figure 3.4. Attaching sealing strip to side plate. Sealing strip is attached to the rear part of the side plate.

Intermediate profiles
When aiming at very high protection classes (IP34-55) with F-serie NBS enclosures, the joint between intermediate profile and front profile shall be sealed with sealing strip as shown in Fig. 3.5.

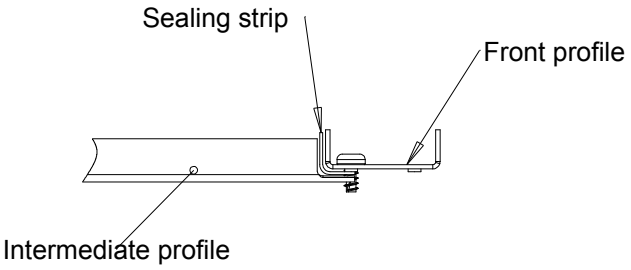

Figure 3.5. Using sealing strip between intermediate profile and front profile

4 BUSBARS

Several different busbar system alternatives, such as systems built on C- or F- serie flanges, can be used in the F-serie NBS enclosure system. Aluminium busbars were used in the temperature rise and short-circuit tests on the F-serie system, see Table 4.1. The system does not, however, exclude the use of copper busbars that can be dimensioned applying the SFS5556 Standard, see Table 4.2.

F-serie busbar insulators (kute and kuten) shall be used as the insulator elements. With fields more than 450 mm in width intermediate insulators shall be used so that the distance between busbar insulators never exceeds 450 mm. The distance between insulators on vertical busbar systems may not, either, exceed 450 mm, see Fig. 4.1.

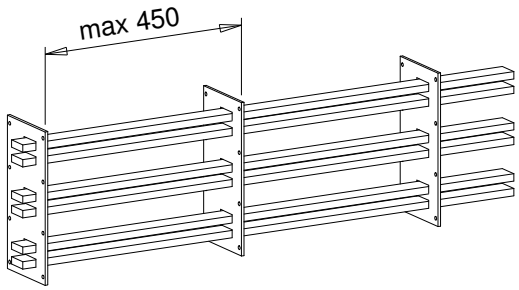

Figure 4.1. The maximum allowed distance between busbar insulators in the F-serie NBS system is 450mm.

The short-circuit resistance (I_{pk}) of F-serie NBS centres can be, as necessary, increased by using a shorter insulator distance than 450 mm (=by adding the number of insulators). Added number of insulators has no effect on the thermal short-circuit resistance (I_{cw}).

No separate short-circuit tests have been made for copper busbars. When evaluating the short-circuit protection of copper busbars the short-circuit resistance value for aluminium busbars and insulators can, however, be used.

4.1 Horizontal busbars

The horizontal busbar system is installed in the busbar compartment of the F-serie NBS enclosure by using busbar insulator holders and busbar insulators. In the F-serie NBS system, busbar insulators made of polycarbonate (PC) are used, with perforations made for 10x10-10x50 flat bars.

Table 4.1. The loading tables for aluminium (E-AlMgSi-T6) busbars (conductivity 31,9m/Ωmm^2) tested in F-serie NBS enclosures with protection class IP30. The marked (1) busbars have been tested for temperature rise.

Rated current I_n [A]	Number of busbars/phase	Al busbar size	Short-circuit resistance I_{cw}/I_{pk} [A]*10^3
400	2	10*20 (1)	17,2/34,1
600	2	10*30 (1)	21,6/42,6
800	2	10*40 (1)	21,6/42,6
1000	2	10*50	24,0/50,4

Table 4.2. Calculated ratings for copper (E-Cu F30) busbars (conductivity 56m/Ωmm²) lying flat in a free space in the F serie NBS cell centre (SFS5556).

Rated current I_n [A]	Number of busbars/phase	Cu busbar size
400	2	5*20
600	2	10*20
800	2	10*30
1000	2	10*40

For enclosures with higher protection class than the one given in Tables 4.1 and 4.2 (e.g. IP30 → IP44) the ratings for busbars would be about 20-25% lower than the values given in the Tables.

4.2 Vertical busbars

Table 4.3 shows the rated currents and the results of the short-circuit and temperature rise tests for vertical busbars in the F-serie NBS cell centre.

According to IEC/EN 61439-1 (Chapter 7.5.5.1.2) the busbars (e.g. branch busbars) and conductors between power busbars and the operating unit feed connections as well as the devices within operating units can be dimensioned field-specifically on the basis of the loads caused by a short-circuit upstream of the short-circuit protector. In other words, the short-circuit resistance of vertical and branch busbars need not be equal to the value for horizontal busbars.

Table 4.3. Loading tables for vertical aluminium busbars. Temperature rise tests have been carried out for the marked (1) busbars.

Rated current I_n [A]	Number of busbars/phase	Al busbar size	Short circuit resistance I_{cw}/I_{pk} [A]*10³
250	2	10*10	7,5/12,8
400	2	10*20 (1)	7,5/12,8
630	2	10*30 (1)	7,5/12,8
800	2	10*40 (1)	23,0/48,3
1000	2	10*50	24,0/50,4

4.3 Equipment earthing

The purpose of equipment earthing is to protect the user against the effects of possible faults in the cell centre or in the external circuit feeding the cell centre. The equipment earthing circuit of the cell centre consists of separate protective conductors or conductive structures or both.

4.3.1 Protective earthing of frame

For protective earthing, the L profiles of F-serie NBS enclosures have holes that can be used for providing protective earthing of the frame. Using M8 screws you can connect max. one 70mm² protective conductor of copper. At this point you must make sure that the connector used provides a sufficient contact area to the frame.

Table 4.4. Cross-sectional area (IEC/EN 61439-1) of protective earth conductor (PE, PEN).

Cross-section of phase conductor S [mm²]	Min. cross-section of corresponding protective conductor (PE, PEN) S_p [mm²]
S 16	S
16<S 35	16
35<S 400	S/2
400<S 800	200
800<S	S/4

According to IEC/EN 61439-1 the cross section of a protective conductor can be calculated from the equation

$$S_p = \frac{\sqrt{I^2 t}}{k}, \qquad (4.1)$$

The equation is used for calculating the cross section for a protective conductor capable of sustaining the thermal load caused by a current of short duration. Table 4.5 contains some protective conductor cross sections calculated using equation 4.1.

Table 4.5. Protective earthing of frame according to rated thermal current resistance (I_{cw}).

Rated thermal current resistance of cell centre I_{cw} [A]x10³	PVC insulated copper conductor Cu [mm²]	Aluminium busbar 10x30 mm
5	35	1
6	50	1
10	70	1
12,5	2x50	1
16	2x70	1
20	2x70	1
25	3x70	2
32	4x70	2
40	4x70	2
50	5x70	3
63	7x70	3

Installing PE busbar
The PE busbar is installed in F-serie NBS centres in the front part of the equipment compartment using PE busbar holders or to F serie/C flange with rail. The PE busbar is connected using connectors that are suitable for PEN, PE, N, main potential equalizing and frame protective earthing connections according to SFS 154 (e.g. YKPEN and YKOL connectors).

4.3.2 Protective earthing of covers and doors

Protective earthing of covers and doors to the frame structure is provided through the direct contact of their unpainted rear parts and the contact surfaces of their fastening screws. Components with max. 16 A rated current can be mounted to doors without separate protective earthing conductor. For higher currents, doors must be provided with separate protective earthing using a conductor that is connected to the door through either a screw and nut connection or a protective earthing screw welded to the door.

4.4 Connecting of busbars

The power busbar system is installed in the F-serie NBS enclosure between the L profile and the front side of the front profile/side plate using busbar insulator holders and busbar insulators. The F-serie NBS cell centre has been tested using horizontal and vertical busbars of aluminium with their rated values given in Chapters 4.2 and 4.3.

To connect conductors to the busbars and busbars to each other you can use various types of busbar connectors (see El-parts Oy's product catalogue, for example).

SFS 154 provides comprehensive information on connectors for aluminium conductors and connections of aluminium busbars. The Table below gives tightening torques for aluminium connections.

Table 4.6. Tightening torques for Al connection screws.

Screw size	M6	M8	M10	M12	M16
Tightening torque [Nm]	6...9	15...22	30...44	50...75	120...190

Connecting feed and power busbars
The busbars feeding the cell centre can be connected to the horizontal power busbars, for instance, as shown in Figure 4.2. Pieces of suitable Al busbar are placed between the feed busbars. Busbars are connected together using screws and nuts as well as various types of connecting pieces and washers.

1. zinced M10 hex. head screw (class 8.8)
2. special washer YKG 28.3 M10
3. horizontal power busbars
4. connecting piece YKG 51/80(/100)
5. feed busbars
6. SFS 3738 pressure washer
7. zinced M10 nut (class 8)
8. SFS3737 conical spring washer
9. spacer piece, e.g. of 10x30 Al busbar

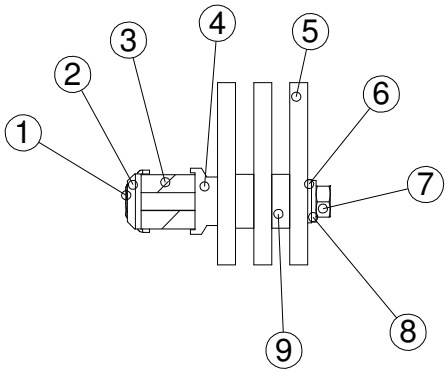

Figure 4.2. Connecting feed and horizontal power busbars together.

Connecting vertical and horizontal busbars together
Vertical and horizontal busbars are connected together, as necessary, using YKG busbar connectors, see Fig. 4.3.

1. zinced M10 nut (8)
2. SFS3737 conical spring washer
3. vertical busbars
4. connecting piece YKG 51/30
5. horizontal busbars
6. special washer YKG 28.3 M10
7. zinced washer YKG 44
8. zinced hex. head screw M10 (8.8)

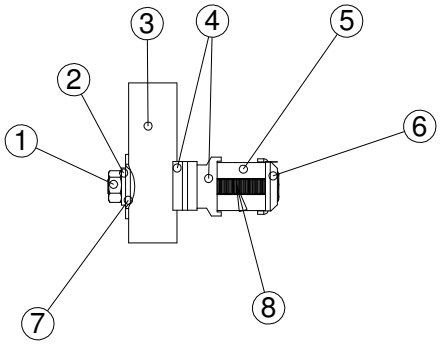

Figure 4.3. Connecting vertical and horizontal busbars using YKG busbar connectors.

When making the connections you must make sure that the requirements on making connections presented in the SFS handbook 154, Chapter 7.1.3 "Ulkoisten johtojen liittimet – Alumiinijohtimien liittimet ja alumiinikiskojen liitokset" are complied with. For example, the mating surfaces of the connection must be deoxidized and the cleaned surfaces protected with connection grease.

Transport break
Any break points made into the cell centre and power busbar system should be located at a cable field to make reconnecting of busbars easier. For example, YKG 51/120 aluminium profiles and M10 screws and nuts are used for the connection as shown in Fig. 4.4.

1. power busbar
2. YKG 51/120
3. zinced M10 hex. head screw (8.8)
4. SFS 3738 pressure washer
5. zinced hex. nut (8)
6. SFS3737 conical spring washer
7. SFS 3738 pressure washer

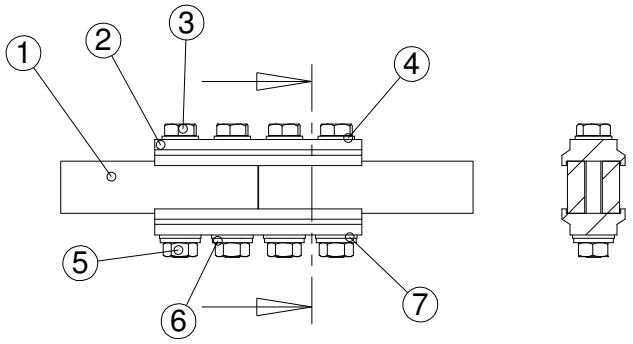

Figure 4.4. Connecting of busbars at a transport break. The busbars are connected using connecting pieces of aluminium (e.g. YKG 51/120), M10 screws and nuts, and various washers.

When reconnecting, the busbar parts are matched together. The connecting pieces are placed symmetrically over the joint, and the screws are tightened to the correct torque (Table 4.6).

5 OTHER INFORMATION

The F-serie NBS cell centre structure is designed for distribution, control, and automation centres as well as enclosures for electronic equipment.

Compliance
When assembling centres using the F-serie NBS system you should ensure with, for instance, piece tests (standard series IEC/EN 61439, Chapters 8.1.2 and 8.3) that the structural solutions of the delivered centres will comply with the type tested centre and meet the requirements of the standards that for the basis for certification.

In addition to the examples in these instructions the requirements and regulations in the IEC/EN 61439 Standard shall be observed when assembling the power busbar system as well as the whole distribution centre. When using the structure you should also consider the various product standards according to which the final enclosed product shall be made.

When assembling the structure you shall utilize the specified screws, lifting eyes, washers, hinges, the components used in tests or corresponding components, and follow the assembly and operating instructions provided by the centre mechanics supplier. The dimensioning of the instrument mountings on the mounting plates complies with the SFS 2529 Standard. Instrument spaces comply with the SFS 5601 Standard.

Manufacturer reserves the right to technical changes.

Compatibility
The parts of the electric centre enclosure systems manufactured by Suomen CNC-Metal Oy are primarily compatible with one another, for instance, the doors and mounting plates are compatible with all systems.

Independency of components
The frame structure and fastening mechanics are designed so that the commonest and standardized electric and mechanical components (e.g. components mounted to DIN rails, feedthrough flanges) are easy to install to the structure. The structures of the F-serie NBS cell centre are not component-dependent, in other words, you can use the components of any components manufacturer.

Safety distances
In the design of the F-serie NBS cell centre attention has been paid on the safety distances between live parts and the conductive parts of the frame. Both surface and air gap distances in the F-serie NBS cell centre are at least 7 mm.

Static loads
Depending on the size, the mounting plates for F-serie NBS are made of either 1.5 or 2.0 mm hot-galvanized steel sheet The structure and the mounting plates can be statically loaded by 2 kg/dm² of mounting plate with components fastened to the mounting plate. In this case, the number of mounting plate screws shall be at least equal to the mass of the component divided by two (2), however, not less than four (4) mounting screws.

Components can be mounted to doors and covers as necessary. The maximum mass mounted to doors is 0.5 kg/dm^2 but, nevertheless, not more than 6 kg per hinge in addition to the door's own weight. The allowed masses fastened to screw-mounted covers are 0.25 kg/dm^2 but, nevertheless, not more than 1 kg per cover mounting screw.

6 TECHNICAL DATA

General

The F-serie NBS enclosure system complies with the requirements in the Standards IEC/EN 61439-1, IEC/EN 61439-3 and IEC/EN 62208. The product complies with the essential safety requirements set for CE marking by the Low Voltage Directive 2006/95/EC.

Insulating voltage U_i	1000V
Rated voltage U_n	≤690V
Rated current I_n	<1000A
Thermal short-circuit resistance I_{cw}	17,2-60kA/1s
Dynamic short-circuit resistance I_{pk}	25,6-132kA
Protection classes	IP20-IP55
Impact strength	IK09
Material	
frame parts	hot-galvanized steel sheet 275MAC
busbar insulators	polycarbonate, PC
Nominal dimensions	
depth	80, 160, 250, and 320mm
field widths	300, 450, 600, and 750mm
Surface treatment	epoxy polyester painting RAL7035 (DH8080)